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EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

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No. 1.

CONSERVATION MEETING.

The greater part of this issue of the *Forester* is taken up by the addresses delivered at the Special Conservation meeting held in the Throne Room, at the Capitol Building, Honolulu, on November 16, 1910, under the joint auspices of the Territorial Board of Agriculture and Forestry and the Hawaiian Sugar Planters' Association.

The several addresses outline clearly the fundamental principles of Conservation in their relation to local needs. These speeches deserve the serious consideration of everyone. In Hawaii the right use of the natural resources is indeed the foundation of our prosperity.

OPENING ADDRESS BY HON. MARSTON CAMPBELL.

GENTLEMEN:—This meeting is called by the Board of Agriculture and Forestry in coöperation with the Planters' Association for the purpose of bringing the representatives of the agricultural, manufacturing and grazing interests in touch with the Territorial Government in matters pertaining to our Natural Resources, their protection and extension to a greater and more beneficial use by the present and future generations, and for the further object of formulating some definite scheme of coöperation to that end.

The Territorial Government, especially its Department of Public Works, in coöperation with the U. S. Geological Survey, the Department of Public Lands and Survey, and the Board of Agriculture and Forestry, through its Bureaus of Forestry, Entomology and Animal Industry, as well as the U. S. Department of Agriculture, are engaged in extensive scientific investigations which are rapidly growing in scope and value to this community.

Within the last year, coöperative agreements have been made between the Territorial Government, the U. S. Forestry Bureau and the U. S. Geological Survey, the latter in two of its important branches of work, viz:

1. Hydrographic Survey, an investigation of our water resources, surface, ground and artesian; the result of such survey will be the information as regards the value of all our water re-

sources. For the past year, the Department of Public Works has been securing data on the ground and artesian water supplies of the Islands, special attention being given to the artesian supplies of the Island of Oahu. The data so far secured has been forwarded to Dr. W. C. Mendenhall, Geologist in charge of Ground Water Investigations of the U. S. Geological Survey, and Dr. Mendenhall's report can be expected in the near future. The surface investigations are in charge of Mr. Martin, District Engineer for the U. S. Geological Survey.

2. Topographic Surveys.

This work is in charge of Mr. C. H. Birdseye, Chief Topographer for the Hawaiian Division. At the present time, the field work of the topographic survey of the Island of Kauai has been finished and the maps will be engraved and ready for distribution by February of next year. On the completion of these surveys, we will have the correct information as regards the physical features of the islands, the location of railroads, tunnels, aqueducts and other culture, and reservoir sites for the future conservation of the ordinary as well as the freshet flows of our mountain streams.

These maps will be of inestimable value to the Territorial Government, in the opening and development of its public lands, and to the individual and plantation interests. Large areas of our lands in both public and private ownership are terra incognita. The surveyors, in order to make a perfect map, must cover every square mile of the surface of the Islands, with the result that our unknown, unvalued lands will have been surveyed and plotted. These maps will also show the areas under cultivation and definite information as regards areas susceptible of cultivation.

Following the completion of these maps will be the investigation of soil and its agricultural value for various crops. The local station of the U. S. Department of Agriculture will, through aid derived from the Conservation Fund, establish sub-stations on the various Islands.

At present we are without all of the necessary information for the development of a general scheme of conservation for our natural resources, and until such time as we are in possession of this data, each particular unit will have to be considered by itself. However, upon the completion of the surveys now under way, all of the information necessary for a complete scheme of conservation for each island can be formulated.

The question has often been asked: "What have we in this Territory to conserve?" That question is readily answered. Our waters, the agricultural life of our country; our soils and our forests. In this Territory, advantage has been taken of our soils and favorable climatic conditions and through the development of our agricultural industries, we are in a position, as regards wealth and prosperity equal, if not better, than that of

most any other community in this world, but we have in a large measure been living upon our capital and not upon the interest thereof.

The large industries of this country have, and are, recognizing the importance of the preservation of our natural resources, and their extension, and have devoted a great deal of attention to forestry. This work has been individual, however, rather than on a larger or broader scheme of coöperation.

I have made a study of the costs of replanting deforested areas within the present and possible future forest reserves, and am much perturbed to discover the enormous amount of labor and expense it will require, and the long period of years over which the work will have to extend, if the deforested areas are replanted. The work would, of necessity, progress so slowly that its protection against land wastes by erosion due to wind and water would be very little.

If we limit our efforts to the commercial side of forestry, we will attain the great end of conserving our several natural resources which are dependent upon forest cover. Our great need is in forest cover whether it be forest planted for commercial ends, or cover which will preserve the land against erosion.

I offer the question of forest cover or commercial forest as one for discussion, and call your attention to the algaroba forests which cover large areas on our Islands, and which, without the aid of man, have extended over thousands of acres of good and waste lands, and made these areas profitable in many ways.

It is possible with slight expense to extend the algaroba forest cover within a few years, over tremendous areas which are now practically waste lands. At present, we leave it entirely to nature and the cattle to extend it. We are particularly fortunate in having this tree as it is prolific with seed and sets forth every effort to reproduce.

A few years ago, it was thought that the algaroba would grow only a few feet above sea level. On the Island of Hawaii, in the dry district above Kawaihae, I have found it growing at an elevation of 2,000 feet, and seeding. Why not make a concerted effort to cover our waste slopes, so far as possible, with this hardy, ready-growing tree, which in itself is an ideal forest, and not depend entirely upon nature and cattle for the distribution of its seed?

To plant an area equal to that of the algaroba forest with trees of commercial value, would be beyond the resources of the Territorial Government or of any corporation. The trees planted in what may be called our commercial forest areas take years before they seed and reproduce, while the algaroba grows with great rapidity and seeds within a short period.

I do not belittle commercial tree planting nor the results which would accrue therefrom, but I do believe that our greatest problem, so far as the conservation of the resources of this country—water and land, can best be solved, is by the extension of forest cover and that as rapidly as possible.

Forest cover does not necessarily mean the tree. It may be grasses or shrubs or vegetable growth of any character which will hold the soils against erosion.

There is some place in this world where there can be found a vegetable life of value that will grow with rapidity upon our higher levels, between the algaroba and our native forests, and within a much shorter period of time, than can possibly be accomplished by commercial tree planting, recover our denuded areas.

The two great natural resources of this country are land and water. To protect one and develop the other, the aid of forestry must be invoked. In few agricultural countries is the duty of water for irrigation purposes as large per unit area as in this territory, especially in the production of sugar, and every effort should be made by the Government and our agricultural interests to extend our forest cover, preserve our soil and develop our water supply to the point of its greatest beneficial use.

The Island of Kahoolawe presents one of the best illustrations as regards results from the destruction of forest cover. Sometime since, in company with Governor Frear and Mr. Frederick H. Newell, I made investigation of this island. Mr. Newell made the statement that in all his experience in the so-called arid West, he had never seen such desolation as was apparent on this island through the destruction of forest cover.

The process of soil production is slow and takes countless ages, and nature to protect and hold the soils supplies a cover. In these islands, through carelessness and preventable causes, we have destroyed the vegetable cover over tremendous areas. These islands, rising as they do, abruptly from the deep sea, the material which is eroded by wind and water is carried to sea and lost forever, there being, as you are aware, no alluvial deposits of any great extent on the islands.

We have a tremendous responsibility, and there can be no division. The Government cannot bear the entire burden, and each individual and corporation must bear its respective share. Our Territorial Legislature should be extremely liberal in appropriations for the purpose of conservation, and I hope to see, within the near future, a most perfect coördination between the Federal and Territorial governments, the planters, the graziers and the individual for the conservation of our natural resources.

GOVERNOR FREAR'S ADDRESS.

CONSERVATION A PRACTICAL THING.

Peaceful movements may be quite as swift, as sweeping and as revolutionary as those produced by clash of arms. What movement today is more comprehensive, more fundamental, more transforming, more vital to the permanent welfare of a great nation than that which is the subject of this conference?

"Conservation," in its present sense, although practically unknown only five years ago, has become a household word throughout the world. The progress of the movement is nothing short of phenomenal. It was ushered in by a John the Baptist in the person of Roosevelt and has been spread by countless apostles fired with the zeal of crusaders. But it is no transient or imaginary thing. There may be some to whom it is only a fad—mere "conversational conservation," as it has been dubbed; there may be some to whom it seems to be only a fad to others; while there may be yet others who in their enthusiasm would so enlarge its scope as to dissipate it into meaninglessness. To the masses, however, as well as to its arch-advocates, it is of the very essence of the concrete and the practical.

It is based upon awful necessity as shown by statisticians, but also upon grand possibilities as shown by scientists; upon a disclosure of reckless exploitation by special interests, but also upon a sure hope for the nation's future through appropriate action for the common interests. It is first of all a moral question—a question of duty to the present and to the future, and then, as is apt to be the case with all moral questions, it merges into the practical question of finding the proper remedy and applying it in a businesslike way. In a word, it is the case of a great people's aroused moral sense guided by its common sense.

Again, "conservation" does not mean the mere husbanding of resources; it does not mean mere prevention of wastefulness; it is not a damper on enterprise; nor does it look mainly to the future. Its cardinal idea is the fullest development and utilization of all of our natural resources, but in a wise manner, by the present generation and by each succeeding generation in its turn.

"Conservation," I grant you, is a word ill-chosen for the purpose, but language is a growth, a usage, a convenience, and words do not always retain their etymological meanings. Literally, "conservation" smacks too much of the selfish hoarding of the miser, that he may count his riches from time to time and gloat over them; but, in its acquired sense, it suggests rather the thoughtful saving of the capitalist, that he may invest and re-invest and so multiply his opportunities and powers for enjoyment and usefulness. Forestry is the most typical form on the strict conservation side, while reclamation is most typical on the

development side. But both sides are intensely practical. Even forests are not created or maintained merely for aesthetic or sentimental reasons. They are maintained to increase and conserve the rainfall and for commercial purposes.

Natural resources are usually classified into forests, waters, minerals and lands. To these, in this sea-girt Territory, we may add fisheries. Public health also is fast coming by general acquiescence to be included in the list.

I need say little in regard to fisheries, except that it is a question to be carefully considered, especially in view of the importance of fish as an article of diet among certain portions of our population, whether the supply cannot be increased through the establishment of fish hatcheries. Nor need I dwell on the question of minerals, although we produce some lime and building stone and may in a few million years produce iron. Dr. Hobdy, I believe, is scheduled to speak on health. Mr. Hosmer is to speak on forests, which, although highly important, are, after all, mainly incidental to water. Mr. Gartley, Mr. Smith and Dr. Hitchcock are to speak on various phases of water, which, in turn, although more directly important than forests, is after all mainly incidental to land, which, in the last analysis, is Hawaii's prime natural resource. When we get to the subject of land in this conservation problem, we get down to bedrock or hardpan—of which, I regret to say, too much of our land is composed.

This land question has many phases, such as those of transportation facilities, methods of cultivation, irrigation, suitability of crops, protection from pests, marketing, finances, etc., but I shall confine myself to one, namely, that of area and with special reference to two present problems.

There are a little more than four million acres of land in this Territory, of which, perhaps, a quarter of a million or so are under cultivation and perhaps another quarter of a million of public land and a third quarter of a million of private land may be capable of being brought under cultivation, but not all of it under existing conditions. One of the most important questions is how to make as much as possible of this area available for cultivation, that is, how to utilize it to the best advantage. I will suggest only two methods at this time.

There are perhaps a hundred thousand acres that can be reclaimed by irrigation. An equal area, or about one-half of the present sugar lands, has been thus reclaimed through private enterprise, and this produces about two-thirds of the sugar crop. The additional hundred thousand acres probably cannot be reclaimed through an extension of the Federal Reclamation Service to Hawaii, because there is too much reclamation work to be done on the mainland. This must be done, if at all, by the Territory or by private enterprise and probably through the issuance of bonds. It is doubtful whether the Territory should issue bonds in sufficient amount for this purpose, especially in view

of the numerous other pressing needs which can be met, if at only by the issuance of bonds. If the work is done by private enterprise, the bonds must be issued for long terms and there must be sufficient security for the bondholders. In order to afford such security, it will probably be necessary to make long leases of arid or semi-arid lands, so that the irrigation companies and, through them, their bondholders, may be assured that water will be put to profitable use, either by the irrigation companies or by their sublessees for a sufficient length of time to pay the cost. Even if the irrigation works should be constructed in the Territory, it would likewise probably be necessary or wise to make long leases—not indeed for the security of the bondholders but in order to make the investment pay—for otherwise capitalists would not venture to start new sugar plantations or other large industries and the homesteading of irrigated lands will probably be a slow process for a long time to come. It is upon such security of long leases or fee simple titles that large irrigation agricultural investments have, as a rule, hitherto been made.

Conditions now, however, have changed, so that it would come out of the question to make long leases without reserving to the landowner the right to withdraw the lands for homestead purposes; and therefore, in order to safeguard the investor, it must be further provided that when the land is homesteaded the homesteader shall not only be given the right to sufficient water for his homestead, but also be required to pay for such quantity of water whether he uses it or not. This is the practice on the mainlands and it is both just and necessary. It is just because the homesteader gets the additional value which the water gives to the land and because he has no right to take the land unless he puts it to good use, and he cannot do that without water. It is necessary because otherwise the irrigation works would not be constructed, whether by the Territory or private enterprise, and the land would not be conserved and developed to the point of its highest utility. The homestead idea does not require that land should be sold in its natural condition in large tracts for inferior uses when it can through reclamation be put to superior uses; on the other hand, the conservation idea requires that, if possible, it should be thus reclaimed and put to superior uses. There can be no reasonable doubt that it is better to divide a tract of land into a large number of small homesteads of high productivity than into a small number of large homesteads of low productivity. But there will probably be some, who, for one reason or another, will contend otherwise and it will be necessary to meet such opposition with firmness in the public interests.

I now pass to the second method, which has to do with conservation in the homesteading of land already under cultivation.

During the fifteen years under the Land Act of 1895 until the recent enactment of amendments by Congress, about nine

thousand acres of public lands passed through homestead forms; but, so far as real homesteading is concerned, a large portion of that might as well have been cast into the ocean. The right of purchase lease under the settlement association plan proved to be the best adapted, and consequently the favorite, method for the exploitation of the public lands for private interests. The situation was a difficult one, but during the last three years it has been met in part by refusing to open up lands under the settlement association plan and to some extent even under homestead leases without settlement associations. The recent amendments accomplish in part two objects. They impose certain restrictions upon the granting of homesteads and their alienation afterwards, as, for instance, by preventing "repeating," and the conveyance by deed, lease or otherwise of homesteads, whether before or after patent is obtained, to aliens, corporations and large landholders, and thus they remove to a considerable extent the inducements for acquiring lands ostensibly for homesteads but really for ulterior purposes. They also render unnecessary to a considerable extent the exercise of executive discretion by substituting therefor certain statutory provisions, which are designed to be self-operative in discriminating between bona fide and fake homesteaders.

There has been and can be very little complaint in regard to lands not already under cultivation or improved, that is, lands which require pioneering work for their reduction to cultivation, and which are the typical homesteading lands, for either people do not desire these or else, if they do desire them, they thereby show that they are bona fide homesteaders.

The difficulty lies with the improved lands, because they are the lands which, if the law permits, can be at once exploited to good advantage at little or no cost in money, time or labor. It may prove to be necessary to restrict the homesteading of cane lands, for instance, to the special homestead agreement method, in order to prevent the waste of such lands and to insure their best utilization. As to price, it is only right to the citizens at large, to whom the public lands belong, that any particular individual who obtains such lands should pay a substantial price, although not the full cash value for which they might be sold if there were no residence and cultivation conditions, but the terms of payment may well be made such as to be burdensome; to give away for a nominal consideration valuable lands, made so by the expenditure of capital by others, would be both unjust and demoralizing. As to residence, this should be required to be of sufficient length and character to insure its genuineness. As to cultivation, this should be required to be begun and kept up on a sufficient percentage of the area to prevent the improved and valuable land from being allowed to go to waste. As to area, this should be no larger than the homesteader can cultivate and no larger than is sufficient to enable him to support his family

well. It may prove best to divide the cane lands into lots of, say, ten or fifteen acres each and give the option of taking up one or two lots, thus enabling each person to decide for himself how much he needs and how much he can handle, and act accordingly, but with full knowledge that his success or failure depends upon himself, and that the provisions of the agreement and the law must be complied with. Such provisions will work no hardship to the bona fide homesteader and will be only what he would wish to do in any event, and at the same time they will take away the incentive of the fake homesteader, so that those who complain will by that very act brand themselves as against the bona fide homesteading of the public lands and in favor of a policy which will enable mere speculators and investors to obtain large values at the expense of the public interests.

There are small as well as large special interests, and for many reasons they are far more difficult to deal with; but special interests in all their forms, whether large or small, must be thwarted whenever they militate against general interests. It is not conservation to give to one man an area of fifty acres on which to pasture a few horses or cattle when it might be divided among five who would maintain it in a high state of cultivation and make their living from it; it is not homesteading to give a piece of public land to a person who proposes merely to obtain a sum of money or an income by selling or leasing it to others; it is not right or just to the public, which owns the land or which is interested in good citizenship and good social conditions, to give land to a person for homestead purposes if it is to be diverted to other purposes. Cane land is commonly worth, say, one hundred dollars an acre. If a person takes fifty acres as a homestead, and, as soon as he obtains his patent if not before, sells or leases it, he makes anywhere up to at least five thousand dollars according to the circumstances, without making the contemplated return of one additional family settled on the land and making its living from it by its own efforts; that amounts to a donation to that extent by the public to the individual. The Territory might as well sell the land outright without homestead conditions or lease it and pay the proceeds as a subsidy or pension to the deceptive individual. The fake homesteader is in substance a mere agent of the government for selling or leasing the land and putting the proceeds into his own pocket, which is a profitable commission business for him, but an expensive method for his principal, the Territory. The case is one, not of the sugar corporation against the homesteader, but of the public and the genuine homesteader against the spurious one.

In this case also, that is, if the public lands are homesteaded in the interests of the people at large and of genuine homesteaders there will probably be an uproar from those who would get something for nothing at the expense of others, and such opposition must be firmly met.

In my opinion, the electorate can be depended upon to stand by a policy that is thus clearly necessary for the public welfare. However loud may be the clamor and however ingenious the attempt to confuse the issue, the special interests, whether large or small, cannot deceive the electorate for any considerable length of time. The fundamental principle of conservation, which is that of utilizing our lands and all our natural resources in the best possible way and for the common interests, must be maintained.

THE PART PLAYED BY THE FOREST IN CONSERVATION.

ADDRESS BY RALPH S. HOSMER,
Superintendent of Forestry.

The five cardinal points for which conservation stands are the right use of lands, waters, forests and minerals, and the systematic safeguarding of the public health. Here in Hawaii we are more intimately concerned with conservation than are most communities. With us the very economic life of the islands depends on the wise use of waters, lands and forests. While standing as we do, the western outpost of our nation, this community has placed upon it responsibilities in matters affecting the public health that require a large measure both of zeal and discretion.

My share on this program is to speak of the part that the forest has to play in Hawaii and to point out certain things that must be done, if our local forests are to be made to render their full service to the people of this Territory.

The forest situation in Hawaii is familiar to most of those in this audience. But let me briefly review the salient points. Hawaii is essentially an agricultural community, largely dependent upon irrigation. Under our local conditions of sharply diversified climate, of varied topography and of the need—the more pronounced because of our limited areas—of putting to its highest use every acre of our arable land, it is essential that provision be made for the wise utilization of every drop of water that can be made to do duty—be it used for irrigation, for domestic supply, for fluming cane or for power development.

This can only be accomplished with the aid of the forest. With our short, steep watersheds, heavy rainfall and lack of adequate storage facilities it is self-evident that the function exercised by the forest on the catchment basins and in general over the watersheds, is of much more importance here than in most other countries. Far and away the chief value of the Hawaiian forest is as a protective cover for equalizing and making dependable the sources of our water supply. For retarding run-off, protecting the surface against erosion and helping to form a natural reser-

voir, from which are fed the streams and springs, it is hard to conceive of a better cover than the dense mass of trees, shrubs, ferns and undergrowth that together make up our native forest. Its value is too evident to require argument.

But under present day conditions such a forest can only be permanently maintained by being cared for. That this may more effectively be done, forest reserves have been created and a general program drawn up looking to the adequate care of the forest. But such a plan takes time to carry into effect and the co-operation of all forest owners, be they the general public, interested as joint owners of the public domain, or more directly, because they themselves control land in fee simple.

A good start has been made, but much of what has so far been accomplished is but preliminary to what waits to be done. Before the house can be built the foundations must be laid. So with the creation of a forest reserve system. The fixing of boundaries, the proclamations, and the coloring in of areas on a map are but steps toward the realization of an ideal. The time has now come in Hawaii when we must go further.

And why is it that we must do this? Why this constantly recurring talk of forests and forest protection? Why not leave it to the government officials to look after the forests? That is what they are paid for.

The answer to these questions is simply and solely because in Hawaii forestry is a business necessity. Wood and water are the first needs that must be satisfied in any community. Both are products of the forest. Wherever it can be got water is the most valuable product that the native Hawaiian forest can be made to yield. In Hawaii, without the native forest we should be without water. And in our planted forests, we have, too, an asset of constantly increasing value; for the production of wood is one of the pressing needs of local conservation.

The truth of these assertions is self-evident. But notwithstanding, there is much delay in putting into practice things which everybody agrees ought to be done to make our forests render their full quota of service. The object of this meeting is to bring home to those on whom rests the duty of managing the material resources of Hawaii, the fact that wise use means not alone the prevention of waste but as well, and even more, the full utilization of all our resources. The prevention of waste does not mean the locking up of our natural resources. That is no part of the conservation program. On the contrary the keynote of conservation is use. But use from the standpoint of conservation essentially means *wise use*—use by which we may enjoy the benefits from a given resource, not only today but also in the years to come. And in Hawaii this cannot be brought about save through the coöperation of all concerned.

Now obviously the first step in wise use is to stop waste. And unfortunately all over the Territory waste is now going on—

waste of waters, of forests and of lands. This is not good business. It must be put an end to. When artesian waters are not needed for actual use the wells must be shut off. Where erosion can be checked by altering the method of cultivation, that must be done. And where the forest by being protected can be made the better to do its part, it is but short-sighted economy that refuses to build the necessary fence.

In an address made at the recent Conservation Congress at St. Paul, Henry S. Graves, Chief Forester of the United States, said: "The practice of forestry by private owners is a public necessity." This declaration is particularly applicable to Hawaii. All the more important of our local forest reserves are made up of both government and privately owned lands. To secure the most efficient management of these areas requires that the owners of the lands coöperate with the government more actively than they now do. The most pressing needs in the forest reserves at present are, in most cases, fencing; in some the extermination of wild cattle and goats; and in others the replacement of the forest on areas where the growing of trees is the best use to which the land can be put. In addition there is always to be considered the planting of waste land with trees of commercial value.

It is no part of the plan of the government to abate its activity in forest work, nor to shirk any responsibilities that rightly belong to its officers. On the contrary it is the desire and intention of the Board of Agriculture and Forestry each year to render more and more efficient service through its several divisions. But it is not enough that the forest officials do their work. Seeing to it that the forests of Hawaii get proper care is a matter quite as much to the interest and benefit of individual land owners and corporations as of the government itself. We cannot hope in this Territory to make our forests do their full duty until all who are charged with their management give evidence of their faith through tangible works.

Not making this plea on the grounds of abstract altruism. Putting up to you as business men, a business proposition. The time has come when to make the most of our Hawaiian forests there is demanded the active coöperation of forest owners. The place has been reached where the owners of Hawaiian forests cannot afford not to take active and united action for the better protection of the forest, both by seeing to it that the appropriate branches of the government are given the adequate financial support by which alone can the government lands be properly administered, and also, and fully as important, themselves undertaking forest work each on his own land in conformity in a general plan.

Enough merely to pass resolutions approving and endorsing forest projects. The time has come to put words in action. To take active management of the forest reserves.

his plantation. Let every land owner have in mind the condition of his forest holdings. Are your forests, and through them your streams, receiving the protection that the best interests of the plantation demand to be given them? Is there not somewhere a place where a short stretch of fence would shut off and protect a large area of forest? Are there not areas of waste land that if protected would grow up again with native forest, or that could be planted with useful trees of commercial value? These, gentlemen, are practical questions. I put them to you because I believe they are of real and vital moment. Every one can be translated directly into terms of money and everything done is for your own benefit. Can you afford not to take account of these realizable assets?

It is not within the scope of this talk to go into details of what should be done in this or that place, or to prescribe ways and means. By this time every one now in Hawaii likely to need such service, ought to know that the staff of the Division of Forestry is always ready to advise forest owners how best to care for their forests and where, when and how to plant trees on their areas of waste land to get certain desired results. The object today is not to give such advice. What I have tried to do rather, is to set each man thinking if there is not forest work on his own land that if it were done would increase the value of his property; that if it is not done, will result in its depreciation.

I do not forget that much excellent forest work has been done by private interests in Hawaii and that the last year has been marked by a gratifying increase in forest planting by numerous plantation companies. But it is not enough. Every plantation company that has waste land ought each year to plant up definite areas with forest trees quite as regularly as it harvests its cane. It ought also—and of the two this is the more imperative—to fence off and efficiently protect the areas of native forest from which come its supplies of water. From my knowledge of the Territory I am positive that to incur the expense necessary to get such work started is in every case a good investment. It is for your own interest, gentlemen, that I ask you to give these subjects thought. Forestry in Hawaii is not a matter for any one man or set of men; it is one that in its results affects us all.

The purpose of conservation is so to use the natural resources that first and foremost we ourselves may derive the fullest benefit from them today, but also that we may then pass them on, unimpaired, so that those who come after us may continue to enjoy the same benefits. Let us, here in Hawaii, look to it, each man on his own land, but all working together to a common end, that every one is doing his part to conserve through wise use the most important of our natural resources, the forests and waters of Hawaii nei.

MAKING WISE USE OF ALL OUR LANDS.

ADDRESS OF DOCTOR E. V. WILCOX.

I think that we have heard so many times that the development of industry in any country depends upon its agriculture that sometimes we forget how absolutely and eternally true that is. And when it comes to considering the use of land in Hawaii, one of the things that I think would strike the average observer is the enormous quantities of land which are now made little use of.

Naturally the very first question that we ask concerning those lands is, what can be done with them, and how can we get something doing on those lands that will remain in operation and develop an agriculture that will be permanent?

One of the points which lies at the very foundation of establishing an agricultural system in any country is the matter of developing a home, and by a home I mean a home with some sentiment attached to it. There is no use of ever imagining that a population of small homesteaders can be established in any country where they cannot develop homes; where the conditions are such that they cannot make homes that are attractive, because a home that simply consists of a few acres of land where some potatoes can be grown and a few other things to eat, and where a house can be put up which will protect them from the rats and other vermin, does not constitute a home.

It is so evident in going about among these tracts of land where homesteads ought to be, and where all the natural conditions are favorable for homesteading that this one idea is largely absent. Merely a building and a plot of land are to be seen and you wonder how any one could be prevailed upon to stay upon the land much longer than is absolutely required to make enough money to get away.

Recently I had occasion, in connection with some other gentlemen, to see what was an awful example of the conditions which I have just described. In the course of our stay on Hawaii we came across an old German who was living on a small homestead, a man who told us his age was sixty years. He had cleared a small space in the midst of a veritable wilderness and put up a little hut where he could crawl in out of the rain, and here he was serving out his time as a convict serves out his sentence until such time as he had fulfilled the requirements of the law bearing upon the residential clause of the Homestead Act, and hoping that sometime he might prove up on this land. He raised enough sweet potatoes to eat; and he informed us that he expects to go away and work where he can earn some money after he has acquired title to this land.

Until we understand how to produce things that can be marketed with profit, so that there will be something to hold a man,

aside from the few potatoes and other things which he is able to raise in order to live, the outlook for homesteaders is dreary.

Agriculture is not only the basis of industry, but it is the hope of the future development of commerce between countries, and it is the hope of the development of all other industries.

Now in Hawaii we have the possibility of growing nearly all kinds of crops; there is hardly anything you can mention that we cannot grow here in certain places.

The main reason which seems to stand in the way of the more rapid development of agriculture is the matter of markets. The question arises, what are we going to do with things after we produce them? There is no use in advising a man to plant things for which there is no market, or at least, no ready market, and from which no immediate returns can be obtained. This applies particularly to homesteaders who depend absolutely on what they can grow in one or two years and who have no means to wait for a development of a long-time crop. There is no use of advising them to grow things which they cannot sell—for which they cannot obtain ready money. To simply make a meagre living is not farming. A man cannot grow everything that he requires in life. There must be some income from the crop which has a regular standing in the world's market or in our local market.

It seems to me that we have to reckon almost exclusively on crops which can be sold on the mainland or here in the Islands, and which bring ready money and which will put a man in a position to have a home that may be considered a real home and give him a little extra money so that he can decorate that home. In this way we shall avoid forcing the homesteader into the awful condition in which a man is merely existing.

A number of crops have been studied that will warrant further development and show possibilities for really prosperous homesteads in a good many localities.

One of the crops of which some of us have had great hopes for a good many years is cotton. We can produce a very fine quality of cotton here in localities to which it is best adapted. We do not expect to use up all of the land which is not now used for something else, for this crop, but a good many of the lands which are now being let go to waste could be used advantageously for this crop. Naturally, there are different men who wish to cultivate different things; but this crop is a money crop; there is nothing that is more absolutely a money crop than cotton,—simply so much cotton so much money. It has a regular market price.

Commercial outfits are now working at the tobacco business, and incidentally, making it possible for small farmers to grow this crop and dispose of it to these commercial concerns, and in that way receive enough money to cure their product, and to encourage them to go on in the cultivation of tobacco on a small

scale in localities about the large tobacco plantations. But this main point comes up whenever you mention the production of these crops, and that is, where are we going to market it?

And when you take up the production of cotton or tobacco or of any other crops in which the freight problem is not very great, we still have to consider at once that if you get far away from a large outfit which is growing these things, you immediately meet with difficulties in marketing that crop. A small man does not know how to market the product with the least expense. It costs too much to prepare it for market and transport it to the market. The homesteader can not deal alone with long-time crops, but must grow a crop to get returns from it immediately, and he cannot endure a delay. The one way in which these difficulties can be overcome at present is by being located near a large outfit which grows this crop and knows how to handle it. These people take it over from the homesteader at a reasonable price and that gives encouragement to the small man to locate about those centers.

The market conditions here in the Territory at present, as I have already stated, are being studied very actively and as you have all doubtless heard, a proposition is now before us to attempt to encourage the production of crops which can be marketed in Honolulu by securing better market facilities here in Honolulu, as well as better shipping facilities, so that transportation will not eat up all the profit there is in it.

In addition to cotton and tobacco, which are really among the new possibilities of money crops here, there is an old one which, in one sense, I consider rather more important than either one of the two above mentioned, and that is bananas. It is more important, I should say for the reason of its enormous tonnage, and immediately opens up the necessity of greater shipping facilities, which is what we most need at the present time. I scarcely need to say, being relatively a newcomer among the most of you, that the possibilities of banana growing have been demonstrated in numerous localities. The capacity of the banana industry is limited only by the shipping facilities now offered. You know, probably, that about 15,000 bunches a month are shipped out of these Islands. You also probably know that the banana industry could be increased rapidly, particularly in Hilo, and I believe that it is a dependable and very conservative thing that inside of two years, if the proper boat facilities and marketing arrangements were made in the Territory of Hawaii, could put out about 250,000 bunches a month. Now that is a very encouraging thing in this banana business; it is an industry that can be developed in a great many locations here is nothing growing at present. Bananas flourish in a variety of rainfall and a great variety of soils and can be grown here as well as in the other islands.

lutely impossible. And it is unquestionable that a great area of land could be devoted to bananas which at present bears almost nothing which is worth mentioning from an agricultural standpoint. We have a pretty good supply of Bluefield bananas, which in itself is an encouraging feature of our banana industry, because that is what they want on the mainland. There is almost nothing that seriously attacks the banana at present. The insect and fungus diseases amount to almost nothing on them; very rarely there is a disease which attacks the top, as a sort of blight, which is serious in some countries but is not serious here, so that it is a crop with a minimum of troubles and disadvantages to the man who comes into the tropics relatively unprepared to cope with the problems of tropical agriculture.

One point more in connection with this banana industry: I think I am now at liberty to say that there is a very active movement now on foot on the part of perhaps the largest banana concern in the world, to get our bananas; and I think it would be simply the making of our banana business if this plan is ever realized; in fact, there can be no question about it if they take up the crop here. They pay right here at the wharf in Honolulu and ship entirely at their own risk. The proposition now is to pay fifty cents for a good bunch down to thirty cents for a smaller bunch. Whenever a man shows a receipt that he has delivered so many bunches he can take this certificate to the bank and get his money when the bananas are delivered. And the moment the industry warrants this greater shipping, there will be two or three five-day boats put on here. They have already been designated to take this trade when it is developed, I mean two boats have already been selected to carry bananas where they can be gotten in quantities that will warrant this increase in the present shipping facilities. Now a proposition like that shows that here is an industry that can be developed. I believe that in time instead of the 15,000 bunches of bananas shipped at present, the amount can be increased to 250,000. It is only necessary for one to think of the history of two or three of the Central American localities where the natives used to live in the utmost misery, but where the conditions are now most prosperous as a result of having a regular and dependable outlet for all the bananas which can be produced. It has been largely the making of such countries.

I do not think I am exaggerating the importance of the banana industry; because it has an important bearing on the shipping and getting transportation from Hawaii, and possibly from Maui, to the mainland and getting a fast service which would certainly be of immense benefit to the Territory.

I think I might be allowed to mention one other point that bears on forestry lines, rather than upon the soil; and yet the title of the little talk I am making is such that I could not be called down for talking on anything under the sun.

There are certain lands that are now absolutely occupied by the keawe and it is a mighty good thing that they are. A number of gentlemen have recently been trying to estimate the value of the keawe bean in the Territory. I have looked over the figures and they seemed so outrageously large that I simply took a chance in one instance of dividing them by twenty-five, and still they were appalling.

On a recent trip to Maui I had to ride horseback along the road from Kihei down to the Coconut grove, going towards Ulupalakua, a distance of about eight miles altogether. On both sides of the road was a perfect jungle of keawe trees; and the ground was covered with the pods. I should also say that the hogs and cattle were doing all they could to get rid of them, but still there are tons and tons going to waste; and the cattle and hogs realized the fact that there was a luau for them, and only picked out the fattest looking pods, and all the rest were trampled upon and lost. Heretofore there has been little commercial interest in our keawe; but there is a movement now on foot with the Japanese government to take large quantities of them, using them for the Japanese cavalry. These pods are unquestionably worth nearly as much as barley. Now if a sugar plantation, or if a ranch, or if any large commercial outfit were to scatter several tons of barley under some shade trees they would have essentially the same proposition. But what will you do with them when you get them is the question asked by many. Would they get a market for them immediately? I consider that unquestionably the keawe bean as a forage proposition—as a feed crop—has been greatly underestimated. It has been one of the greatest blessings to Hawaii that she has ever known. We do not realize it exactly, when we allow these beans and pods to go to waste under the trees.

THE CONSERVATION OF HEALTH: WHAT THE INDIVIDUAL AND CORPORATION CAN DO.

ADDRESS BY DR. W. C. HOBODY.

Mr. Chairman, Ladies and Gentlemen:

The conservation of health, from the individual standpoint, is a feature that I am not going to dwell upon very long this afternoon, for in an audience of this kind, we all know enough to keep clean morally and physically, to eat slowly, to sleep in the open air and to be sure of the purity of our water supply. Further than that, we need not go into the conservation of health, so far as the individual is concerned. I am not going to pay any more attention to that at this time. I do not want you to

consider me an alarmist. I have no desire that you should look upon me as an extremist, but I have not come here this afternoon to talk to you in platitudes or glittering generalities, neither am I going to tell you what is being done on the mainland to take care of the public health. I am going to talk to you about things right at home,—what is and what ought to be done in order to protect our public health, which will be of lasting and untold benefit to Hawaii.

In the brief time that is allotted to me, I can only sketch for you the situation, point out the danger and indicate the remedy.

First, as to the situation: Hawaii has been called the cross roads of the Pacific. She is at once the stepping stone and stopping place between all points on the East and the West.

A glance at the Promotion Committee's map will show her lines of commerce running to all points of the Pacific Ocean. This from a commercial standpoint is of untold advantage to this Territory, but from a sanitary standpoint it is not, because Honolulu gets it both coming and going.

Steamship lines are increasing in number. Steamer speeds are increasing annually. They are running to all of these points that concern us and the time between grows year by year a little bit less. Will you bear with me just a moment as I name some of these points on the East and on the West and the diseases they harbor.

From Seattle to Callao, we have, today, plague, smallpox, yellow fever and malaria; to the south and west, we have smallpox and plague; in the Straits Settlements, in the cities of Calcutta, Bombay and Singapore, we have smallpox, plague and cholera; the cities of Hongkong and Shanghai along the coast of China have plague and smallpox, and Amoy, not to be outdone by her sister on the Straits, has all three of the diseases. The same is true of Kobe, Nagasaki and Yokohama. Seattle, San Francisco and Los Angeles have within the year had plague. They have today smallpox, and the country back of San Francisco is infected with plague and will be for years to come. This is partly the situation, what is the danger?

You all know that smallpox, plague, yellow fever and cholera are quarantinable diseases. They are so called because they have shown the power to spread in waves over large portions of the earth, claiming for themselves innumerable victims as they move.

Plague, during the last ten years, has averaged more than half a million deaths in India. In addition to that, there is one other disease that is not considered a quarantinable disease, and that is malaria. Malaria is more dangerous to this territory than yellow fever. Just a word about how you can get these diseases:

Plague is a disease primarily of the rat which is transmitted to man by means of the flea. Wherever ships go the rat will go. He has the plague in chronic form and where the rat goes, plague will go.

our streets spitting to the right and to the left, just to assert his proud and free and independent spirit. Unless we can create a public sentiment against this custom, and unless an educational campaign is started, that condition of affairs is going to continue.

Now as to the remedy: Hawaii is indeed a Paradise of the Pacific, and you gentlemen, here before me, representing the chief industry of this Territory, are the very bone and sinew of our material prosperity. What you want, you get. Your interests and rights are paramount in the affairs of this Territory.

Is there one individual here of you sound, hard-headed business men, who believes that you can carry on with the greatest success your work as sugar planters, unless our health conditions are maintained? Is there among you anyone who throwing aside the dollars and cents, is willing to sacrifice Hawaii's present reputation—the most beautiful and healthful place in the Pacific Ocean? Gentlemen, I do not believe that there is. You gentlemen are today straining every nerve to extend your acreage and increase your yield.

I come to plead with you for Hawaii's future, because once yellow fever gains an entrance here it will start an epidemic that will claim hundreds, perhaps thousands, of victims, an epidemic that will blast Hawaii's reputation abroad, cost hundreds of thousands of dollars to eradicate and no man can estimate the cost to our commerce and your business through the quarantine restrictions that would be imposed against us. It will be equally as disastrous should malaria gain a foothold here.

Mauritius was known as the Paradise of the Indian Ocean. It was a place where England sent her officers and regiments from India to recuperate. Yet from a paradise it became a pest hole. Sometime between '61 and '65, malaria was introduced and in the next few years 350,000 people perished from the disease and those islands have never recovered from the blow. That is what will happen to Hawaii if we do not take the necessary steps.

I want you to appreciate that you are men who get things, and I want you to act as disciples and go back to your homes and talk about what I have told you until there will be created such a sentiment in favor of this thing that it will have to come, for in no other way can we get it. It is a fact that every great movement has to be preceded by a campaign of education.

The Board of Health for three years has been carrying on a campaign against rats in an effort to make this place plague-proof, and if in addition to this campaign against the plague rats, you will use your influence in a campaign against yellow fever and the mosquito which is here, and also against the conditions which make their breeding possible, you will have done for Hawaii the greatest and most beneficial piece of work you have yet attempted, and you will have safeguarded your own future, for I assure you, most candidly, you cannot carry on your work with the same financial success unless Hawaii's health conditions are

maintained and improved. And these conditions can only be maintained,—our future can only be safeguarded,—certain disaster can only be prevented by you and the general public awakening to the seriousness of the situation and all hands uniting with the Board of Health to make Honolulu and Hawaii not only pest-free but pest-proof.

ECONOMY IN THE USE OF SURFACE AND ARTESIAN SUPPLIES.

ADDRESS OF HON. W. O. SMITH.

Mr. Chairman, Ladies and Gentlemen:

When Mr. Hosmer invited me to speak this afternoon, he said it would be for a few moments. We have listened to so much that has been instructive and interesting that what I have to say will be in the nature of suggestions.

We all know in a general way—and we have had it impressed upon us this afternoon—of the importance of the water supply, i. e., most particularly the economic use of water.

The islands are essentially an agricultural country. Our manufactures are very limited, and probably will never amount to much, but we depend upon agriculture. There are five prime and essential phases involved in successful agriculture, namely: soil, climate, water, labor and market. Climate we can not regulate, and market we do not create, but all of these five are essential links in the chain of sure prosperity.

We do know today what water and labor can do. It was but a comparatively short time ago that on Kauai we produced but 800 tons of sugar; now we produce about 128,000 tons. On Oahu, about 800 tons, and this year we had 128,000 tons; on Maui, taking Lahaina, Wailuku, Kihei, Grove Ranch, Hana, Paia and Ulupalakua, there were possibly 4,000 tons a year. This year our records show 140,000 tons. I will not speak of Hawaii, because the plantations on that island depend in a large measure upon rainfall and not upon irrigation. Wherever enormous progress and development has been made, it has been due to the application of water. There was rainfall before on Kauai and on this Island and Maui, but it was not until brains, labor and engineering skill were brought into play that these results were attained. The first irrigation works were constructed by Mr. G. N. Wilcox at Grove Farm, Kauai. We now have many on Kauai.

Yet with all this, as we have heard from the Governor this afternoon, with a little over four million acres of land, there are about 750,000 acres which are considered to be arable and about 250,000 acres are under culture. It is very difficult to tell how much of this land which is now used by ranches may be

made arable, but the Governor has given attention to that and has estimated that there are 250,000 acres of public and 250,000 acres of private land which could be made arable if they had water. Then we have heard of those products that may be made to grow, which Dr. Wilcox has referred to, so that it is unnecessary for me to dwell upon that. But I would like to call your attention to what the prosperity of other insular countries somewhat similarly situated depend upon.

Java, Sumatra, the Philippines, Porto Rico and Cuba each has a limited local market, notwithstanding the eight and a half millions in population which they have as compared to our little eighty thousand or ninety thousand, so their local market is larger than what we have. Our local consumption is very limited. Now these countries depend almost entirely upon a certain few products which have a world's market, such as vanilla beans, tobacco, sugar, hemp, etc. Others have sugar, tobacco, coffee and a few such other main articles. Dr. Wilcox has spoken about cotton. Then there is coffee, tobacco and sugar.

Our line of development has been almost entirely along sugar, and for very good and sufficient reasons. When the Treaty of Reciprocity went into effect, only two products went in free, and those were sugar and rice. It was along these lines that the prosperity of the country has been built up, but it is a dangerous thing to depend entirely upon one source of supply. The sugar plantations on these islands have developed an Experiment Station with corps of scientific men in the different branches, such as plant diseases, entomology and agriculture, and other agricultural branches. They have fought against insect pests and have developed the work so that the sugar industry, so far as dangers to the crops are concerned from pests, has very little to fear. The dangers from drought are not very great on account of the water supply and the development of the artesian supply, but we cannot control market.

With the great development of the sugar industry in Europe and the great possibilities of Cuba, there is a constant menace, and in order to develop this remaining half million acres of land, and we may be sure that there will be development—there will doubt be required a certain proportion of the water not now used. There will be further development and conserving of water and in due time there will be a larger supply than we now have and it is not unreasonable to expect that a certain portion of the water now used for sugar will be diverted to other crops.

It is the policy of the territorial and Federal governments to develop the water resources of the islands, and it is unnecessary to say that it is not the policy to develop the water resources of the islands, but it is incumbent upon us to see that the water, to see in the first place, that it is not used in such a way that it should be allowed to have its value lost. It should be capped. A great

advance has been made in the use of surface waters by the storage of night water or waste water in reservoirs, so far as it was possible. And more notice is constantly being taken along these lines, as in the researches which are being carried on by the Experiment Station. These have been reported upon at this annual session of the Sugar Planters' Association. The investigations show that certain kinds of cane require less water to produce results, and along these lines investigations are being followed to see whether cane that will produce an equal amount of sugar can be produced with a less amount of labor and water.

Of course it is useless for me to talk to plantation men about economy, but there is one point which has presented itself to me in thinking of this subject, and that is the danger of expanding the work of the plantation beyond the amount of water which is available. In the great struggle to get large crops,—because the profits are small, and the profit consists in having a large output—the temptation is to expand to get a larger crop, and there is danger in the same, because of the area being in excess of water supply; in which case there is no economy in the use of water. I shall not attempt to say more in regard to what would be an economic use of water on the plantation. I have thought it more valuable to make suggestions in regard to the value of water and the danger of having to use less in some cases in the future.

I had thought of several other points, but since Doctor Hobdy has told us of all these diseases, I imagine that I am afflicted with all of them.

CONSERVATION OF WATER POWER.

ADDRESS OF MR. ALONZO GARTLEY.

The savage man is very closely bound to nature and his life is circumscribed by the natural resources. This condition he accepts and governs his wants and life accordingly. Evolution from the savage to the civilized man has brought about a very complex condition of life, and with it the necessity of controlling the resources of nature and making them contribute to his material wants. Discovery, invention and transportation have all been contributory to a higher state of living, and have rendered resources available entirely unknown to the savage. Incidentally, the wants being more readily and certainly supplied have constantly increased. This mastery and appropriation of the natural resources has made man highly civilized and yet dependent. Should these resources fail what would be the result?

It is imperative that the natural resources be not impoverished, for a high civilization can endure no longer than these resources.

Failure of any resource will not come suddenly, but failure is inevitable unless the resources are properly conserved.

Water is one of our most valuable natural resources, and yet we are apt to consider that the supply is inexhaustible. True, we can exercise but little control over the supply of water in general, but we can exercise control or influence over the manner in which it reaches us.

In the Hawaiian Islands we enjoy the use of water for irrigating and as a source of power. Our streams are too small and quantities of water insufficient to be available for navigation. The watersheds and capacity for storing water are very limited, and it is necessary therefore that we make of them the best use possible.

It is not necessary to touch upon the value of water for irrigating, but as a source of power the possibilities of development and utilization should be given serious consideration. The development of electricity during the last twenty-five years has been very rapid, and today over 30% of all the power used in the United States is utilized electrically, and it is predicted that, within the next ten years, fully half of the power used will be electric power. It is also estimated that the water power in the United States available for the production of electricity is five times the total amount of power now in use. Thus it is self-evident that, if properly conserved, and developed, water power is available for supplying all of the necessary power to be utilized in the United States for many generations to come.

The water power available in our Islands is necessarily very limited, and it is of the utmost importance that it be conserved. At the present time a few developments have been made which are of considerable economic value, nearly all of this power being used to generate electric power for irrigating pumps.

* Of the developed powers by far the largest amount has been developed on Kauai. The developments there on the property of the McBryde Sugar Company, Kekaha Sugar Company and Makee Sugar Company aggregate 5,600 H. P., all of which is in constant use twenty-four hours a day, pumping 50,000,000 gallons of water per day, varying in heads of from 175 to 443 feet. There are some smaller developments at the Oahu Sugar Company, Waianae Sugar Company, Pioneer Mill Company and Hawi Mill Company, all used for pumping purposes. The entire electric supply in the city of Hilo, and for the street lighting of Honolulu, is derived from water power. Water is also utilized in many mills, especially on the north coast of Hawaii, to operate machinery and electric generators for use in the mills. The aggregate horse power of these developments is approximately 8,000 horse power.

It is impossible to make a close estimate of the prospective power development, and at best an estimate can be made of only such powers as have been rendered available through partial developments made for irrigating purposes, or where the possibilities are self-evident. The conservation and development of

water at high levels for irrigating purposes will render many other plants both possible and expedient. A close approximation of the ultimate developments can only be made when records of the rainfall, cost and economic values of the developments and complete surveys of the watersheds are obtainable.

A rough approximation would indicate that there is so much available:

On the Island of Kauai.....	12,000	H. P.
" Oahu	2,500	"
" Maui	4,000	"
" Hawaii	8,000	"
	<hr/>	
	26,500	"

It is essential for power purposes that the permanency of the supply be assured. In the majority of cases in the Islands the storage of water is very expensive and difficult, but it should be borne in mind that the development of storage capacity increases the value of the water supply for irrigation purposes and incidentally renders security as a power source. The building of high level reservoirs would no doubt increase the estimate of the amount of available power.

It is not always expedient, however, to develop available power for the broken character of the country and limited amount of arable land at proper elevation makes the economic value of powers questionable. It is extremely important, however, that any owner of a source of power, or any individual or corporate interest, or the Territory, should be sure, when developing water for irrigating or other purposes, that all the power possibilities be fully investigated, and that the water be developed in such a way as to utilize it with the greatest possible economy.

Many new developments will arise in years to come to require the use of electric power in our mills, in the development of new industries, the installation of labor-saving devices of all kinds and possibly the manufacture of fertilizers for use in the fields. These are details, but the main, underlying principle should be kept in view, namely, that the greatest amount of power can be developed with the greatest amount of water at the greatest head and as all water power will prove of great economic value to the Territory, it should be conserved.

THE GEOLOGY OF OAHU IN ITS RELATION TO THE ARTESIAN SUPPLY.

ADDRESS OF PROFESSOR C. H. HITCHCOCK.

When it was first suggested that artesian flows might be made available in Oahu, some called attention to the fact that our rocks were volcanic, of a kind that had not been found productive

elsewhere. Nevertheless, the wells increased in number. To explain this phenomenon it was surmised that the lavas were disposed in layers, partly porous and partly impermeable, thus affording the same alternation which had yielded the favorable results in the stratified rocks. Usually there was a succession of earth, clay, limestone or coral, and the water gushed forth when a solid rock floor was reached. Coupled with the discovery of Tertiary fossils, it is now possible to propose a new theory of the artesian conditions in agreement with the early demur at the notion of the origin of the streams of water from lavas.

Extinct species of mollusca of the genera *Ostrea*, *Chama*, *Conus* and *Purpura* demonstrate the Tertiary age of the beds enclosing them. In the railroad cut near Waipio to the west of Pearl City is a solid bed of oyster shells a foot thick, belonging to the extinct species *Ostrea retusa*, interstratified with sands and clays. The limestones near Diamond Head yield many shells and corals of the same age. The formation indicated is the Pliocene. Until now it has been currently stated that the Hawaiian Islands were the very latest geological product, entirely post-Tertiary. The picture is drawn of a volcanic vent at the bottom of the sea, discharging lava and gradually building up a basaltic cone upon which corals flourished and made reefs. There is no reason to change the nature and order of this process, except that the beginning of this work is set back somewhat earlier in time. That will enable us to add considerable to our geological history, and render possible the discovery of mineral deposits, such as beds of clay and earthy iron ores, which have been already pointed out.

Summarizing the data, I have indicated the presence of a terrane of Tertiary deposits upon Oahu, between Koko Head and Barber's Point, underlying several famous sugar plantations, besides the city of Honolulu, and extending more or less entirely around the island, rising as much as 300 feet above the sea level. For the sake of definiteness I have given the local name of *Pearl Harbour Series* to these deposits, perhaps 1,000 feet thick, consisting of sands, conglomerates, clays, limestones and sundry volcanic products, all resting upon a hard basaltic floor. The elongated dome of Koolau, on the east, may be compared to the house over which rain flows abundantly upon either side, percolates the porous sediments, yielding artesian flows tapped by the drill. Owing to the copious rainfall flow will be found all over the productive belt next the sea. A contour map of this floor based upon the positions of the old layer will show the presence of channels more or less corresponding with the existing valleys. At the beginning of the period of deposition Oahu stood as much higher as is indicated by the depths of the wells, and the slow growth of the coral

reefs, alternating with volcanic discharges from the secondary craters.

Some have supposed that the fresh waters were retained in place by dams of coral or sediment near the shore line. It is not necessary that such obstructions shall exist, as the underground like the surface streams push against the salt water as if it were a wall. If the pressure of the brine exceeds the downward current of the fresh waters the two will commingle. Occasionally the salt replaces the fresh water so that the well is worthless, and in other instances strenuous pumping will develop more of the salt. In other instances the fresh water escapes in springs near the coast or at some distance out to sea.

The artesian wells of the Atlantic coast come from water-bearing strata in the Tertiary or cretaceous rocks in material analogous to that pierced by the wells in Oahu. Long Island is a region where the water supply has been thoroughly investigated. The city of Brooklyn is supplied with water furnished by both surface and artesian wells sunk in porous strata. Like ours the artesian supply rises to about 30 feet above the sea. The deepest wells are about 700 feet deep and the water is derived entirely from the rainfall. There is an underground current stronger than that near the surface and salt water deteriorates the supply when near the shore line or when the pumps are used excessively. The lowest rock foundation consists of crystalline rock, mud like our basalts, which do not yield water.

Hence by accepting the doctrine of the derivation of our artesian waters from beneath the unconsolidated Tertiary sediments, we can be in accord with the well established belief in the origin of the streams from similar rocks elsewhere, and may perhaps be warned against unnecessary expense in exploiting unpromising territory. The Island of Hawaii seems to be very like the original Oahu in that it is elevated and lacks the coral reefs and that may explain the poor success of borings there for flowing wells.

MAGAZINE ANNOUNCEMENT.

A new departure in the Conservation Field is the decision of the National Conservation Association to publish a monthly illustrated magazine as its official bulletin. The title of the magazine will be "AMERICAN CONSERVATION." It will make its first appearance February 1, 1911.

Since Conservation has become a great National issue, there has been wide demand for a magazine covering the broad range of the Conservation movement and so conducted as to keep the thousands of individuals who are interested in the subject informed, authoritatively, as to our natural resources, what is being done with them and what ought to be done with them, and of Conservation activities in general in America and other parts of the world.

"American Conservation" is to be devoted to just that purpose. It will be popular in style and profusely illustrated. It will present

articles by leaders of national reputation, eminent specialists, and other well-known writers who will tell how specific Conservation problems are being worked out practically, both in our own and other countries.

"American Conservation" will be strictly non-partisan and will deal with the subjects within its field without prejudice or political bias.

"American Conservation" will present not only articles covering the varied field of natural resources but, with them, it will report systematically the progress of Conservation legislation, both Federal and State, and will present notes of important administrative action affecting the natural resources, besides additional information of special value to students, speakers, librarians, members of clubs, and others who are studying any phase of the Conservation question.

Under the postal regulations, "American Conservation" can be sent only to actual subscribers. The subscription price is \$2.00 a year.

If you wish to keep in touch with the progress of the Conservation movement forward currency, check; or postoffice order to the National Conservation Association, Colorado Building, Washington, D. C., and you will be enrolled as a subscriber. Membership in the National Conservation Association is one dollar a year for ordinary members; three dollars a year for active members. Subscription to the magazine is extra, but friends of the Conservation movement should both join the Association and subscribe to its journal.

BOARD OF AGRICULTURE AND FORESTRY.

Division of Entomology.

SPECIAL REPORT ON BANANA IMPORTATION.

Honolulu, Dec. 14, 1910.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—There seems to be a desire on the part of Mr. Clark, who represents one of the largest banana shipping concerns in America, to import from Central America and other areas about the Gulf of Mexico large quantities of banana sprouts of the Bluefields banana. Dr. E. V. Wilcox of the U. S. Experiment Station consulted me regarding the requirements for such shipments into the Territory.

In 1903 the Board of Agriculture and Forestry allowed some 500 Bluefields banana suckers to land under very careful inspection and I understood that at that time several insect pests, borers, etc., were found. The plants were given to the Experiment Station for distribution under certain agreements.

I have carefully investigated the reports and bulletins dealing on the banana industry of Central America and the West Indies and beg to submit the attached report and I also submit a copy of extracts from the minutes of the Board of 1903.

Under existing conditions I would advise the Board not to

allow any banana sprouts to be brought into this Territory, and I would recommend that a regulation be immediately passed prohibiting such shipments with a proviso that in case of the desirability of importing a new variety of banana, said importation shall be subject to the approval of the Superintendent of Entomology and propagated under his personal supervision for at least six months or a year. This would also apply to other plants and fruit trees.

Our banana industry is practically free from pests and diseases and great care should be taken in preventing any new diseases, which are at times very difficult to detect, from entering the Islands. It seems to me that if we are to extend our banana industry we have ample material of the Bluefields banana to gradually do this and if a shortage now exists the Chinese banana, which has given good satisfaction on the coast, could be temporarily and later on substituted by the Bluefields.

Awaiting your action in this matter, I beg to remain,

Very truly yours,

EDW. M. EHRHORN,
Superintendent of Entomology.

BANANA DISEASE IN AMERICA AND CUBA.

We reproduce below the articles on banana diseases by Dr. R. E. B. McKenny and Dr. Edwin F. Smith, of the United States Department of Agriculture, which appeared in the well-known American paper *Science*, and were referred to by a correspondent in our issue of June 7.

THE CENTRAL AMERICAN BANANA BLIGHT.

BY DR. R. E. B. MCKENNY.

In 1904 the writer made a trip through a number of farms in Costa Rica and in the Province of Bocas del Toro, Panama, for the purpose of investigating a serious banana disease reported by the planters during the two previous years. Since that time the disease has been more or less continuously studied by him.

"The disease" or "the blight," as it is commonly called by the planters, spreads rapidly. While in 1904 whole valley districts were free from the disease, there is now scarcely a single farm in the regions above mentioned that is not suffering from its ravages. The blight occurs in the Panama Canal Zone; also, by report, on the Atlantic side of Nicaragua, Honduras and Guatemala. The disease has been known for many years, but only within the last decade has it alarmed the planters. As early as

1890 a few isolated spots were known to be affected, and from these the spread of the disease can be traced.

In Panama at least 15,000 to 20,000 acres of banana plantations have been abandoned and many thousands more are seriously affected, while in Costa Rica the damage has been even greater, so that it is safe to estimate at least \$2,000,000 capital loss in these two regions in the last five years.

Young and old plantations are attacked with equal intensity. Plants are also attacked on various soils—sands, clay, etc. The disease seldom becomes evident until the shoots have reached a height of four to six feet at the collar (point the leaves diverge). Commonly the first external sign is a rapid yellowish and subsequent browning and wilting of one or more leaves. Sometimes there is a striking curvature and yellowing of the terminal part of the leaf-blade, while the remainder is still green. Eventually all the leaves die and fall back against the trunk, leaving a crop of suckers which in turn are killed and give place to still weaker shoots. The fruit of diseased shoots rarely matures, and even when mature is worthless with blotched, somewhat shrivelled surface and dry, pithy interior. Shoots which develop after one or two suckers have died rarely reach the flowering stage. When they do, however, weak, distorted, worthless bunches are produced.

On cutting the pseudo-stem across and longitudinally many of the bundles are found to be of a yellow, reddish or reddish purple color, the color deepening toward the root-stock. In the last stages the color of the bundles may be almost black. While in recently affected plants, the vessels of the upper part of the stalk and the leaves may be normal, those of the root-stock are always colored. In most cases the thin partitions separating the air chambers are wrinkled and collapsed. The juice of diseased plants contains much less tannin than that of normal plants. A nauseating odor is often given off when leaf-stalks which have been diseased for some time are cut open, though there may be no sign of rotting in the trunk.

It has been proved that the disease is not due to local conditions such as too wet or too dry soil, etc., yet some of these conditions may prejudice the plants to the disease. There is a seasonal periodicity in the activity of the blight corresponding to the periodicity of growth in the banana plants. It is during the stage of most rapid growth that the plants most easily succumb, particularly from April to July. In periods of less active growth many plants seem to recover, but only to die during the next season of rapid growth. Neither drainage nor improved methods of cultivation and pruning have checked the disease. Indeed, increased fertilization seems to make it more virulent. There is no evidence that insects are in any way responsible for the trouble.

Microscopic examination of the stained vascular bundles

above mentioned shows that the coloring is due to a rather insoluble gummy substance (not a true gum) that more or less completely plugs the vessels and cells of the xylem. In this bacteria and, in some cases, fungus hyphae, were found imbedded. Bacteria organisms isolated in Central America from diseased material have been cultivated by the writer and inoculated into healthy plants on the plantations and in greenhouses of the Department of Agriculture in Washington. The results of this phase of the investigation will be given later. It may be stated, however, that the blight is in all probability a vegetable parasite which makes its entrance into the plant through the rhizome or roots.

No good method of control of the disease has yet been found. The progress of the disease in its early stages may be delayed by digging out and burning diseased plants, replacing them with healthy suckers.

The hope of continuing the banana industry successfully in the affected districts lies in the substitution of an immune variety. This the writer has found in a Chinese banana now occasionally grown in Central America. This sort is easily grown, yields good fruit, and has been found entirely resistant. The plantain is slightly but not seriously affected by the blight. The red banana is also subject to this blight, but less than the common yellow (Martinique) variety.

BANANA DISEASES IN CUBA.

BY DR. EDWIN F. SMITH.

My attention was first called to this disease in December, 1908, by Mr. Horne, of the Cuban Experiment Station, who requested me to study the cause of the disease. Up to this time I have been unable to visit western Cuba where it prevails, especially in bananas used as shade for tobacco, but I have received several lots of diseased material, and now have affected plants growing in one of the Washington hothouses.

The signs of the disease so far as I have been able to obtain them from Cubans, and as the result of my own examinations, correspond quite closely to those described by Dr. McKenny, and also to the banana disease described by Mr. Earle from Jamaica in 1903. A similar, if not identical, disease prevails in Trinidad, according to statements made to me by Mr. James Birch Rorer, from whom I have also received alcoholic material. A similar disease occurs in Dutch Guiana, according to statements recently received by me from Dr. van Hall, director of the experiment station in Suriname. I am inclined to think that the Central American disease is also the same as this disease, al-

were present Messrs. Thurston, Giffard, Brown, Dole, Perkins and Smith. The cuttings were surrounded with a large amount of soil, some of them in a filthy condition and the question arose as to what should be done with them. At this meeting it was decided that they be taken to the Government Nursery to be inspected by the entomologists and then removed to the Federal Station, where they could be propagated.

Mr. Perkins, questioned as to whether he had any other report to make upon the condition of the bananas, aside from that made at the informal meeting, replied that he had spent three or four hours at the Nursery, and found a number of living insects and also remains of a new borer, but could not say whether the insects were present in a larvae state.

Mr. Perkins, upon being asked as a Government official, whether or not he would allow the admission of these bananas, replied that it was not a question of entomology, but one of judgment. Upon being asked by Mr. Smith whether any experiments had been made to kill cane borer, said that he had made some but found it extremely difficult to kill the borer without killing the cane.

Mr. Smith stated that the banana growers of the Islands are very anxious to procure a number of these plants, for it means a good deal of money to them, and remarked that if the Board does not permit the admission of such importations, individual growers will make attempts to get Bluefields at their own risk. He stated that gas treatment would remove every possibility of the introduction of living insects and should hate very much to have this importation destroyed on the mere "fragmentary evidence of insects having been discovered in connection with the roots."

A motion was made by Mr. Giffard, seconded by Mr. Dole, for the purpose of discussion, that the action already taken by the members, at the informal meeting, be confirmed, but said that he would not vote in favor of the admission of this shipment.

Mr. Giffard did not believe it would be right for the Board inconsistently with the entomologists whom it should look to for advice on such matters. He hated to see the bananas destroyed, but he did not like to see a few propagated at the Government Nursery.

Mr. Giffard then stated that he had seen a few insects on the bananas, but that he did not think it was worth the trouble to destroy them, for we are looking as though we were making a living out of them.

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plants and it was decided that, at the suggestion of Mr. Smith, a mild treatment of carbon bisulphide should be adopted.

A motion was made, seconded by Mr. Dole, that the bananas be removed to the Federal Station to be cared for where they could be watched and be under the direction of the Board and the Board's entomologists could see them at any time.

Mr. Carter moved an amendment to this motion, stating that the bananas be first disinfected at the Nursery and then turned over to the Director of the Federal Experiment Station for propagation and care, it being understood that the suckers be distributed subject to the option of the Board. Motion carried.

Mr. Higgins of the U. S. Experiment Station, stated that he had given considerable time reading up literature pertaining to banana growing, in many countries, as Jamaica, West Indies, Central America, South America, Madagascar, Canary Islands. So far as he has been able to discover he has found no one complaining of the appearance of the borer, and further states that the bananas there are practically free from insect pests. He also stated that no other insect has proved injurious to any extent, except the black Aphid, which is already existing here.

Mr. Van Dine said that there was not a great amount of soil with the plants, and in his opinion they will all germinate.

PRODUCTION OF VOLATILE OILS AND PERFUMERY PLANTS.

Of the countless numbers of plants in the vegetable kingdom, many possess peculiar aromatic odors. Before the art of distillation was known, the ancient peoples used odoriferous plants and spices in their dried forms for their agreeable odors. Gradually, however, the development of special utensils for other domestic purposes may have resulted in the discovery of methods for the separation of odors from plants and plant products. The first mention in ancient Greek writings of the separation of an odor from a crude substance is that of the oil of cedar, which was separated from the oleoresin by means of the crudest form of apparatus. With the development of the necessary apparatus, extensive perfumery industries have arisen. In southwestern France a general perfumery industry of great importance, based on the production of lavender, cassie, rose, violet, and other perfumery plants, has grown up. The attar of roses from Bulgaria and Turkey, the rose-geranium oils from Algeria, Reunion, and other French colonies, the lavender and other essential oils from England, and the citrus oils from Italy, as well as the lemon-grass, citronells, vetiver; and other volatile-oil and perfume-producing products from India, may be mentioned as important in-

dustrial products. In the United States and in Japan the production of peppermint oil and its products constitutes an important industry.

At the present time the number of plants in the United States yielding oils in a commercial way is very small, but the number capable of yielding oils of probable value is correspondingly great. At present the cultivated plants are principally the mints, peppermint and spearmint, together with small quantities of wormwood, tansy and wormseed. The wild plants include sassafras, wintergreen, sweet birch, Canada fleabane, blue-gum, wild bergamot, horsemint, and pennyroyal.

Oil of turpentine has been distilled commercially for more than a century and is produced on a very extensive scale. Unlike most volatile oils, the oil of turpentine is not distilled directly from the plant but results as one of the products of the distillation of the oleoresin obtained from several varieties of pine trees.

Information concerning plants yielding materials used in the manufacture of perfumery products, also concerning the processes and apparatus required to utilize these oil-bearing plants, is given in Bulletin No. 195, of the Bureau of Plant Industry, U. S. Department of Agriculture, recently issued.

BY AUTHORITY.

RULE VII.

RULE AND REGULATION BY THE BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY CONCERNING THE PREVENTION OF DISTRIBUTION OF THE MEDITERRANEAN FRUIT FLY FROM OAHU TO THE OTHER ISLANDS.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby make the following rule and regulation:

Section I. For the purpose of preventing the spread of the Mediterranean Fruit Fly (*Ceratatis capitata*) from the Island of Oahu, Territory of Hawaii, where the same has established itself, to any other Island in the Territory, all persons and corporations are hereby prohibited from carrying or shipping oranges, lemons, limes, mangoes, alligator pears, guavas, peaches or other soft meated fruits grown on said Island of Oahu to any other Island in the Territory.

Section II. Any person or corporation violating the above rule shall be guilty of a misdemeanor, and shall be punished by a fine not to exceed Five Hundred Dollars, as provided by Section 390 of the Revised Laws of Hawaii as amended by Act 82 of the Session Laws of 1905 and Act 112 of the Session Laws of 1907.

Section III. This regulation shall take effect from and after the approval thereof by the Governor.

Approved:

W. F. FREAR,
Governor of Hawaii.

Honolulu, Territory of Hawaii, November 21, 1910.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Kon, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications
SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207,
HONOLULU, HAWAII.

EDW. M. EHEHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

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BANANA CLOTH.

In view of the anticipated expansion of Hawaii's banana industry, it will be interesting to know that cloth made from banana fiber is attracting attention abroad. An exhibit of this product made at Chunking Fair was the subject of a report by Mr. J. L. Smith, British consul at that place. The Tropical Agriculturist quotes an Allababad paper as saying, relative to the same exhibit: "There is not a village in India that has not its clump of banana trees and not a village in which the fruit is not gathered and the fiber in the stock wasted. It has been left to the Chinese to teach us how the tons of banana fiber thrown on the rubbish heap every year can be converted into banana cloth and sold at a most remunerative price." Consul Smith describes the process of banana fiber manufacture, part of which is similar to that of extracting the fiber of ramie. He says that only a few pieces of the cloth have been made experimentally, for which reason the price is high, being about \$5.75 the roll of five yards, one yard wide. It is claimed that the cloth is extremely durable. Nowadays the byproducts of many natural growths and manufactures greatly enhance the profits of many primal industries, so that this Chinese invention of banana fabric may add materially to the importance of banana cultivation everywhere.

HAWAIIAN SCIENCE VALUED ABROAD.

Tropical Life (London) for November, 1910, contains a review by A. Gordon Howitt, B. Sc., of "A Study of the Composition of the Rice Plant," by W. P. Kelley and Alice R. Thompson, being the twenty-first Bulletin issued by the Hawaii Agricultural Experiment Station. According to the reviewer this treatise on rice "marks a decided step forward in the investigations on the manurial requirements of the rice crop. During the forward march in the study of economic crops," he continues, "the cultivation of rice seems to have been neglected; and so these careful results with useful deductions attached are all the more welcome." Mr. Howitt makes an abstract of a portion of the Bulletin and concludes in these appreciative words: "In a summary at the end

of the Bulletin we note that it is the intention of those in charge of this experimental station to issue a more popular publication setting forth the practical bearing of these experiments, and we therefore await this publication with much interest, as it is felt that the distribution of such a Bulletin amongst planters would be greatly to their advantage." No doubt the exhaustive article on "Rice and Cotton Investigations in China and Japan" by Mr. F. G. Krauss, which was published serially in last volume of *The Forester and Agriculturist*, will also have attracted great interest far from Hawaii.

DRIED BANANAS IN GERMANY.

Dried bananas and what are known here as dried banana chips have been offered for sale in Germany with increasing commercial success for more than two years.

It is impossible to obtain reliable statistics, as the import figures are included with those relating to fresh bananas, both the dried and the fresh fruit being free of duty. Importers consulted state that they have been able to sell without difficulty all the bananas shipped to them, and that the difficulty has been rather to obtain the goods than to find a market.

The consumers of dried bananas and banana chips were originally vegetarians, who discovered attractive ways of serving them, but there is now a considerable demand for the dried fruit in all classes of society and one susceptible of being extended materially.

Thus far the best dried bananas have been received from Jamaica, which also seems to be the chief country of exportation. The whole fruit is shipped in wooden cases weighing 25 kilos, or 56 English pounds, and chips are received in sacks. Importers are paying 25 marks (\$5.95) per 100 English pounds for goods delivered in Hamburg, at which price a fairly remunerative business can be carried on. Any substantial increase in the wholesale price would react unfavorably upon the consuming market.

Verily, the time may come when it will be a question of teaching grammar in agricultural schools instead of that of teaching agriculture in grammar schools as now. There in Lee, in enlightened Massachusetts, a recent spelling match in the grammar school grades of the public schools yielded 14,000 errors in 83,000 attempts to spell words given out. Spinach was missed eighty-six times and the pupils had an equally hard time with macaroni.

The January *Forester* was distinguished as the conservation number. Its verbatim reports, nowhere else published, of the addresses at the conservation conference in Honolulu in November constitute a valuable symposium upon what is actually being attempted in Hawaii for conserving natural resources and the public health.

SOIL AMELIORATION.

One of the Most Vital Points in Scientific and Modern Agriculture.

By J. F. C. Hagens.

Soils in their natural condition, if their surface is sufficiently disintegrated and weathered to support plant life, are covered by a vegetation suitable to their climatic and other conditions, as well as their particular chemical composition. This original natural selection has been somewhat modified and changed by man, who has gradually converted a large part of the earth's surface into arable land and in many instances by extraordinary efforts has reclaimed and converted into extremely fertile and productive soils large tracts of almost totally unproductive waste lands. On the other hand, erstwhile fertile soils have often been made unproductive or sterile by improper treatment and ignorance. The proper treatment and cultivation of soils is of the highest importance, and in most cases far more important than fertilization.

It is imperative that our agriculturists be cognizant of this fact, as it forms the secret of the great success of their European brethren. This is the principal reason why soils in Europe, that have been cropped for centuries, are producing better crops today than ever and are, as a rule, in better condition than formerly.

Fertilizing with commercial fertilizers aims principally to improve the natural fertility of the soil by supplying it with a store of available plant food and correcting deficiencies in one or more of the essential plant food elements. It rarely ever improves the condition of the soils, and often the continued injudicious use of certain commercial fertilizers works harmfully in the latter direction. Constant and proper care directed toward preservation of a favorable condition of the soil and the creation of such conditions where absent is, therefore, of great importance; for, however fertile a land may be, it will not be truly productive if its mechanical, physical and chemical condition is more or less unfavorable to plant life.

This preserving and conditioning of soils is called "amelioration," and forms the basis of all successful and scientific husbandry. Many viewpoints have to be observed in order to avoid a one-sided and unrational treatment.

The best results are naturally obtained where the proper attention to amelioration is paid from the beginning, with the first reclamation of the virgin soil, and all essential points should be carefully observed. Still, it is never too late to begin with a soil already under cultivation, and this should not be lost sight of even with the most productive lands, for

sudden physical or chemical changes may have serious consequences.

The clearing and reclaiming of virgin soils for the purpose of rendering them available for agriculture requires a great deal of knowledge and care lest serious mistakes be made, which can only be remedied later on at great expense.

Forest Land.

In reclaiming forest land the removal of the timber and underbrush is the first operation. As a rule the heavy timber is easily disposed of for building or fuel purposes and the cutting is of no expense, or rather a source of revenue. The removal of the heavy rock and the cutting of the underbrush is often a serious and expensive problem. Frequently this is disposed of by burning, but such a radical method is often not practicable nor advisable, and in such cases the local conditions must be taken into consideration.

As a rule, forest lands are very rich in humus, and burning is therefore advisable; in fact, beneficial, since the ashes will tend to neutralize their more or less pronounced acidity, due to the decay of vegetable matter. If the land is somewhat poor in humus and the surface soil shallow, burning will often be found harmful and the roots and underbrush must be disposed of in another way. In most instances the conversion of forest lands into an arable condition will be hastened and assisted by an application of lime or marl.

Meadows and Pasture Lands.

Soils that have been used exclusively for pasturing purposes are as a rule not immediately fit for the growing of crops, but must receive the proper treatment before they are in proper condition. Thorough cultivation first of all is essential, consisting of ploughing, harrowing and rolling. The grass sods must be destroyed by burning or other methods, and if the soil is found to react acid, lime must be applied. It is often found very beneficial to leave such lands after the first ploughing in the rough furrow exposed to the air and sunlight for some time. This alone will often sufficiently

are more or less unproductive, can be reclaimed and made to produce good crops if properly treated. Humus and lime, and also sand will be found of great service in changing the physical and mechanical condition of

Sandy Wastes.

The reclamation of sandy wastes is accomplished by similar means as that of heavy clays, only that instead of sand, clay is used, which will serve to bind the sand grains.

Alkali Deserts.

Alkali lands, so abundant in the continent of the United States, can, as has been frequently shown, be converted into extremely fertile soils. This is accomplished by suitable irrigation and drainage. This subject will be treated exhaustively later.

Peaty Marshes.

Reclaiming peaty marshes is attained usually by burning the surface and treatment with sand, clay, lime, etc., thereafter. Suitable drainage is usually necessary.

(To be continued.)

BOARD OF AGRICULTURE AND FORESTRY.

Minutes of the Meeting of the Board of Commissioners of Agriculture and Forestry, held in the Throne Room, at the Capitol, on Monday, November 21, 1910, at 2:00 o'clock p. m.

Present: Marston Campbell, President and Executive Officer; Messrs. D. P. R. Isenberg, H. M. von Holt, and Albert Waterhouse, members; Edw. M. Ehrhorn, Superintendent of Entomology; and Ralph S. Hosmer, Superintendent of Forestry.

The minutes of the meeting of October 26 were read and, with the amendments made, ordered approved and placed on file.

FORESTRY.

Mr. von Holt said that there was nothing before the Committee on Forestry on which to report.

Mr. Hosmer said that he should like to give notice of a proposed visit to Maui, primarily in connection with forest planting. Some time ago, following Dr. Lyon's determination of the cause of the death of certain areas of forest in the Koolau district on Maui, the H. S. P. A. Experiment Station, at the request of the Alexander & Baldwin plantation interests,

undertook the experimental planting of exotic forest trees in that section. Recently, owing to pressure of other work and the fact that the investigation required the services of a forester rather than a botanist, the director of the H. S. P. A. Experiment Station has requested the Division of Forestry to take over the supervision of this investigation, the expenses of which are to be borne by the plantation interests. As this work is indirectly in line with the plant introduction studies now being carried on, the Division of Forestry was glad to accept this proposition. The present trip is to make a careful examination of the area to be planted with the idea of drawing up a comprehensive plan. While on Maui, Mr. Hosmer said that he also intended to arrange the details in regard to the planting of government land at Kailili and above Wailuku, and also to visit and arrange for additional planting in the experimental tree planting plots on the slope of Haleakala. The duration of this trip will probably be three weeks.

On motion of Mr. von Holt, it was ordered that the trip proposed by Mr. Hosmer be approved.

FINANCES.

At a meeting of the Board of Apportionment, held October 24, 1910, for the purpose of determining the expenditure of the one-fourth of the special fund provided for by Act 33 of the laws of 1909, the following sums were set aside for the various purposes:

The sum of \$3500 per month beginning July 1, 1910, for the uses and purposes of the Board of Agriculture and Forestry.

The sum of \$600 for printing and distributing eucalyptus report, marketing and gardening report and other bulletins.

The sum of \$1363.06 for the use of the Board of Agriculture and Forestry in planting and fencing the Pupukea Forest Reserve and the Pupukea-Paumalu Water Reserves, and payment of outstanding contracts.

The sum of \$20,000 to be available at the rate of not more than \$10,000 a year beginning with December 1, 1910, for the use of the Board of Agriculture and Forestry in planting and fencing the Kohala Forest Reserve.

The Secretary submitted the regular monthly report of the finances of the Board, which was approved.

MEDITERRANEAN FRUIT FLY.

Mr. Ehrhorn stated that there was nothing further to report in regard to the Mediterranean fruit fly, but that he is continuing his investigations as to the spread of the pest. He reported that no communication had been received from the California Commission of Horticulture in response to his of October 6.

The chairman reported that Rule VII, concerning the prevention of the distribution of the Mediterranean fruit fly from Oahu to the other islands, which had been drawn up by the Entomologist and approved by the members of the Board of Agriculture and Forestry and by Attorney-General Alexander Lindsay, had been submitted to Governor Frear and that the Governor saw fit to change the wording somewhat, but the rule would be approved and ready for publication in a day or two.

Mr. Ehrhorn stated Brother Matthias Newell of Hilo had reported that a party near the Volcano House remembered the importation of raspberries from the Coast, which plants died in a similar manner as the thimble berry does in the same locality. From this Mr. Ehrhorn said it is concluded that the disease which is killing off the thimble berry was brought in on these plants from the mainland, where this disease is known to kill off the *rubus* family; that Brother Matthias had scattered infested tops of the thimble berry along healthy areas near Hilo, in order to ascertain how successfully the disease can be spread, and that an endeavor is also being made to inoculate plants in the laboratory which will be sent out to the infested areas, and in that way it is hoped to spread the disease.

Mr. Ehrhorn said that recently a number of inquiries had been received regarding the importation of birds to the Islands, and that some time ago this question was taken up by the Hawaiian Entomological Society.

Mr. Isenberg remarked that during his visit to Germany he observed, at cattle corrals, some small birds picking flies off animals.

Mr. Ehrhorn said he knew of two species of birds, one in Australia and one in South Africa, that are feeders on cattle flies. If it were possible to bring in such species, it would mean a great deal to the cattle raisers and the owners of dairy herds.

The Board conceded that because of the chances of their change in habits, it was of the utmost importance that great care be taken in the importation of birds into this Territory. Mr. Ehrhorn thought, in view of this fact, it may be found necessary to erect large cages for purposes of observation before the birds are actually liberated.

After further discussion regarding the presence of birds imported a few years ago, also the feasibility of having a large aviary in Kapiolani Park, which would serve as an object lesson to the public, more particularly to the school children, Mr. Ehrhorn suggested that if the Board would officially instruct him to get into touch with the Chief of the Biological Survey of the United States Department of Agriculture, he

could then systematically go about the matter of obtaining definite data.

On motion of Mr. Isenberg, it was voted that Mr. Ehrhorn be instructed to make the necessary investigation with regard to the importation of beneficial birds into these Islands.

ANIMAL INDUSTRY.

Mr. Waterhouse read from Dr. Norgaard's statement of animals examined as follows:

Total number tested—bulls.....	55
cows.....	2034
Suspicious	53
Reacted	531
Branded	426
Ear-marked	1257
Killed	41

Of all the cattle in the City and County of Honolulu, the total number of reactors of the total number tested is 25.1 per cent.

Mr. Waterhouse stated that Dr. Norgaard had recommended that the new intra-dermal test be perfected as far as possible during the month of December, in order that the Board might be prepared, if such a policy was decided on, to inaugurate a new test of all animals which have already passed the subcutaneous test and consequently have been retained in the various dairies and of all new animals which have been introduced into these dairies since the first test was made.

He further recommended that the Board decide on a definite policy to be carried out in conjunction with the new Board of Supervisors, which takes office on January 1, or with the Territorial Board of Health, or else decide on a complete retest of all dairy cattle of the City and County of Honolulu with the proviso that all reacting animals must be removed from all premises where milk is produced, and either destroyed or else segregated until such a time as the next Legislature may have decided what disposition to make of them. The Board of Supervisors should decide to enforce the milk ordinance and to interpret the section pertaining to tuberculin testing of dairy animals in such a way as to issue a permit to sell milk, to dairymen who have reacting animals on their premises, then he believes that it would be justified in agreeing to test, with the new intra-dermal test, all animals belonging to owners who make application.

MILK COMMISSION.

Mr. Waterhouse stated it had been suggested that a separate division be formed, under the Bureau of Agriculture, which will have the entire control of the milk supply of the city and county, and he advised that the Board take the necessary steps to get the next Legislature to pass such a bill—that is, that the recommendation of the Milk Commissioners to place the milk control under the Board of Agriculture and Forestry, be incorporated by law in the statutes of the Territory.

It was voted to postpone any definite recommendations in regard to milk investigations until a later meeting of the Board.

Mr. Waterhouse further reported that Mr. John Vanhuizen, the livestock inspector for the City of Honolulu, was ill and that his physician had ordered him to take a complete rest for one month.

It was moved by Mr. Waterhouse that Mr. Vanhuizen be granted a sick leave of absence with pay for one month. Mr. Isenberg seconded the motion, which was carried.

Mr. Campbell stated that Dr. H. B. Eliot, the deputy Territorial veterinarian for the District of Hilo, Hawaii, had applied to him for a leave of absence for a period of from four to six weeks for a trip to the Coast on the Zealandia, sailing November 8, his mission being to assist in the purchase of a large consignment of mules in the States of Washington and Oregon. Mr. Campbell referred the matter to Dr. Norgaard, suggesting that the absence be granted, and that he give Dr. Eliot letters of introduction to Dr. Geo. S. Baker of San Francisco, Dr. E. C. Joss of Portland, and to Dr. O. B. Hess, inspector in charge at Seattle.

Mr. Waterhouse moved that the actions of Dr. Norgaard in granting Dr. Eliot this leave of absence and in appointing Dr. O. B. Shipman as temporary veterinary inspector at Hilo, be approved. The motion was seconded by Mr. Isenberg and carried.

GLANDERS.

Mr. Waterhouse read the report of the Assistant Territorial Veterinarian in regard to three cases of glanders which had come under the observation of the Division of Animal Industry and two of which had been destroyed and disposed of in accordance with the rules governing such cases. The third animal was being retained at the quarantine station on the Beach road for further observation.

After some discussion in regard to the deplorable condition of shipments of livestock from the Pacific Coast received at

this port, it was voted that Dr. Norgaard be instructed to draft a letter to the California Society for the Prevention of Cruelty to Animals, asking them to carefully watch all shipments of animals that leave their ports for these Islands, referring more particularly to the shipment received on the steamship Hilonian on October 16, 1910, and also calling special attention to the necessity of care on their part in the shipments of poultry.

Motion was then made by Mr. Waterhouse that the chairman request the Governor that in preparing his bills for the Legislature he incorporate in his report a statement whereby the powers of the Board of Agriculture and Forestry may be increased, in the way of giving the Board more authority in the matter of dealing with the question of introduction of animals, and also laws for their protection, from a humane viewpoint. The motion was seconded by Mr. Isenberg.

There being no further business to be brought to the attention of the members of the Board, the meeting adjourned.

DIVISION OF FORESTRY.

Honolulu, Hawaii, Dec. 28, 1910.

Board of Commissioners of Agriculture and Forestry, Honolulu, Oahu.

Gentlemen:—I have the honor to submit as follows the report of the Division of Forestry for the months of November and December, 1910:

ARBOR DAY.

Following the custom established last year, Governor Frear designated Friday, November 11, as "Arbor and Conservation Day," and in his proclamation recommended its general observance. The part of the Division of Forestry was to supply, free, a few trees each to as large a number of persons as possible. Tree seedlings for Arbor Day planting were given out from the Government Nursery at Honolulu, from the regular sub-stations at Hilo, Hawaii, and Homestead, Kauai, and also from several temporary nursery stations at other points throughout the Territory. Altogether about 45,000 seedling trees were distributed. This is not quite so large a number as was given out in 1909, but as the result of somewhat stricter conditions governing the distribution it is believed that a larger percentage of the seedlings will grow to be trees.

Very general interest in Arbor Day was manifested in all the Public Schools, the emphasis being placed on the under-

lying principles of Conservation. Where it was feasible to do so the local branches of the Women's National Rivers and Harbors Congress furnished speakers, who addressed the school children on this subject.

SPECIAL CONSERVATION MEETING.

In connection with the annual meeting of the Hawaiian Sugar Planters' Association, there was held in Honolulu, on November 16, a special meeting to consider the underlying principles of Conservation in their applications to local conditions. The meeting was under the joint auspices of the Board of Agriculture and Forestry and of the Hawaiian Sugar Planters' Association, and was well attended both by members of that Association—sugar plantation managers and the leading men of affairs in the Territory—and by the general public. Short addresses were made by Governor Frear, Messrs. Marston Campbell, R. S. Hosmer, Hon. W. O. Smith, Alonzo Gartley, Dr. E. V. Wilcox, Dr. W. C. Hobdy, and Prof. C. H. Hitchcock. In that there was thus brought home to a large body of the most influential men in this Territory the salient points of Conservation in its local application, the meeting may be regarded as a decided success. The addresses are being published, practically in full, in the issue of the *Hawaiian Forester and Agriculturist* for January, 1911.

In this connection I might say that I attended certain of the meetings of the Hawaiian Sugar Planters' Association and took part in the discussion that followed the reading of the report of the Committee on Forestry.

FOREST RESERVE REPORTS.

At the end of November three forest reserve reports were submitted by me to the Board for final action; one recommending the creation of a reserve in South Kona, Hawaii; two in connection with the modification and slight enlargement of two existing forest reserves—Kau, Hawaii, and West Maui, Maui.

TRIP TO MAUI.

From November 29 to December 17, I was away from Honolulu on an inspection trip to the County of Maui. Going first to Wailuku, I spent two days in company with Mr. H. B. Penhallow, manager of the Wailuku Sugar Company, going carefully with him over the area planted by his company during the past two years. A most creditable showing has been made on the bare ridges and hills above Wailuku. The Wailuku Plantation is making an investment that cannot fail to yield good returns in years to come.

Pests Intercepted.

The usual greenhouse' pests on plants by mail and express were found on several shipments, and these were thoroughly fumigated before releasing. I have written letters of warning to some of the nurserymen of the Eastern States regarding these shipments and gave them to understand that if they persisted in shipping infested plants we shall refuse their entry here.

A layover passenger from Japan brought a few tea plants which were infested with a wax scale, *Cecropia ruscii*, and as a precautionary measure these were thoroughly fumigated before he could take them to his hotel. The plants continued their journey to the coast on the Manchuria on the 27th. Several packages of seeds were found infested with weevils, and before delivery these were subjected for forty-eight hours to the fumes of carbon bisulphide.

The rice shipments from Japan have been quite large, some 15,027 bags during this month. I am pleased to say that all shipments were found free from the rice weevil.

Another shipment of orchids from Manila arrived on the transport Logan, and quite a number of pests were found dead after the fumigation. Two species of caterpillars, two species of spiders, two species of beetles and silverfish. Each plant is carefully examined for borers before delivery.

The inspector at Hilo, Bro. M. Newell, reports the arrival of four steamers and two sailing vessels, of which two brought vegetable matter. One hundred and nine lots and 1688 parcels were passed free from pests, and thirty bags of potatoes were returned, as these were infested with *Nematodes*, also thirty-five bags were overhauled for scab and six bags rejected. Considering that this is the season when potatoes are usually found infected with scab, I am pleased to report that my warning to the shippers regarding the sending of clean potatoes has been observed.

Under my direction, Bro. M. Newell has placed infested thimble berry tops among some healthy plants growing near Hilo for the purpose of ascertaining whether or not the disease can be distributed by this method; meanwhile experiments are being taken up to inoculate healthy plants in the laboratory.

I received a report from Midway stating that the last shipment of stable-fly parasites had arrived in good condition. As far as we know, the horn-fly does not exist at Midway; however, the manager has promised to send me further specimens of flies and other insects. The parasites sent will reduce the house-fly and the stable-fly on the island.

Several lots of Japanese beetles fungus have been distributed during the month.

Dr. E. V. Wilcox of the U. S. Experiment Station has made inquiry regarding the regulations for the shipment of large quantities of Bluefields banana suckers, some 120,000 plants. These I understand are to come from Central America, and are wanted by Mr. Clark, who represents one of the largest banana shipping firms on the mainland. I have decided to take this matter up with the Entomologist Committee of the Board, as I understand that there was some hitch about the first shipment of Bluefields banana plants into the Territory.

Attached hereto I submit the report of my assistant, Mr. H. O. Marsh.

Very truly yours,

E. M. EHRHORN,
Superintendent of Entomology.

Honolulu, November 30, 1910.

Mr. E. M. Ehrhorn, Superintendent of Entomology, Honolulu, T. H.

Sir:—I wish to report that during November I continued my studies of truck crop insects and have given especial attention to the species found infesting cabbage.

I also have under way a careful study of the alligator pear mealy-bug (*Pseudococcus nipae*) which is such a conspicuous pest on pears, guavas, banyan, figs and various other plants. Fumigation with hydrocyanic-acid gas seems to be a very effective way of controlling this pest, but as this method is practically beyond the reach of persons owning but a few trees, it is necessary to use some other insecticide which can be applied by spraying. I have already experimented with some half dozen solutions, and, although some of the experiments have given very promising results, I am not prepared to recommend a remedy until I have given the matter further study.

Owing to the lack of available crops, the field work on the melon fly (*Dacus cucurbitae*) has been practically at a standstill during the past month or six weeks.

My study of the Japanese beetle (*Adoretus tenuimaculatus*) has progressed nicely both in the field and insectary.

In addition to the special lines of work mentioned I have spent considerable time in collecting, breeding and mounting insects and writing notes and letters and doing other routine work about the laboratory.

Respectfully,

H. O. MARSH,
Assistant Entomologist.

ridge to Wailau, where extensive collections were made comprising all species and classes of plants found in that region.

At Kauluwai the writer spent several days searching for obnoxious weeds as well as grasses, and made, so to say, a botanical survey of the pasture lands. He also proceeded to the Leper Settlement and to Kalawao, where most interesting shore-plants were collected. The trip to the Settlement was made mainly to explore the valleys back of the same, as well as Waikolu, which have been explored very little botanically. Two new species were found in the latter, which will be described in the near future.

The western end of Molokai, which seemed to offer very little botanically, was rather a surprise, as nearly as much material as at Pelekunu was collected in that locality. After having completed that section of the island he proceeded to Mapulehu. From there all the valleys on the leeward side were explored, as well as another ascent made to Pelekunu from Kamalo. A trip was made across the Mapulehu Pali near Puu Wailau into Wailau Valley proper on the old native trail. Several days were spent in the valley, and an attempt was made to climb Olokui, the highest peak in that section, but on account of the heavy rains, which made the crossing of the stream dangerous, and the unwillingness of natives to accompany him, the trip was given up, and the writer returned to Mapulehu over the Wailau Pali, and from there started for Halawa, where the extensive swamps back of the Twin Falls were explored, as well as the valley itself. The preliminary botanical work for the season having been completed on Molokai, the writer returned to Honolulu on April 29th.

The number of specimens collected during the Molokai trip amount to approximately 3000. Besides flowering plants, forage plants and grasses, a great number of lichens, mosses, ferns, etc., were collected, which have been forwarded to various specialists in Europe for identification.

In the month of May I proceeded to Hawaii, landing at Waihaihae, and after arrival went at once to Waiki, where an investigation was made of the different pasture grasses and poisonous plants. Waialeale was ascended three times from Waialeale. A large number of plants were secured. Waimea plains, re-
 1. Waialeale, Nienie, Mana, Haneipoe, Paauhau Nos.
 2. Nohonohoe and other paddocks were searched for poisoning plants, as well as other undesirable weeds.
 3. A complete set authentically named, with a typewritten history of each plant, will be given to Parker Ranch in the near future.

Mauna Kea was again ascended from Kemole, Kaluamannu, and Naunae, Horner's Ranch, as the vegetation at the different localities, and the different localities.

The woods back of Waimea were explored again, especially Alakahi and Kawainui. The writer then proceeded to Kohala. Mr. P. W. P. Bluett, manager of Kohala Ditch, assisted greatly; without his aid it would have been impossible to make such an extensive exploration of the Kohala mountains as it was the privilege of the writer. The lower ditch was followed up way into the heart of the mountains back of Honokane-nui, Pololu, etc. Twice the attempt to cross the intervening gulches from Kohala to Awini had to be postponed on account of the swollen streams, which made the passing with pack mules not only dangerous, but impossible. Finally he reached Awini, and from there proceeded afoot to a camp several miles up in the woods, where he camped with five men who had carried the botanical outfit, provisions, etc., for five days. From this point the summit of Kohala was reached after having cut a sort of trail through the swampy jungle. The botanical gain from that locality was immense. A number of new species were discovered, among them a violet which covered the ground thickly and which scented the air with its fragrance. It grew in an open, flat swamp resembling somewhat *Lehua makanoë* of Kauai, a swamp named thus on account of a stunted ohia which grows in the swamp. Mauna Kea and Kohala Mountain yielded about 3500 specimens, some of which are new, besides a large number of the lower Cryptogams. The writer returned to Honolulu on June 25. From June 26 to July 18 he was occupied in partly arranging the large material collected on the different trips.

On July 19 it was thought advisable to visit the Island of Lanai, arrangements having previously been made with Mr. J. T. McCrosson and Mr. Chas. Gay. Mr. Marston Campbell consented to have Mr. J. Hammond, a local teacher, accompany him. Mr. Hammond had experience in collecting plants, etc., and was therefore a great help in the field; his duty being the drying of blotters and labeling, as well as collecting plants.

Lanai was thoroughly explored from the summit, Lanaihale to Kaa. The valleys Mauna Lei and Nahoku, the two largest ones, were visited, besides Mahana and Kaiholena and the small gulches on the slope of the main ridge.

A new violet was discovered on the main ridge, and seems to be peculiar to Lanai; it is woody, three feet high, with pink flowers and narrow lanceolate leaves. The dry districts were of the greatest interest, especially the valley of Kaiholena. Here also several new species were discovered. The material collected on the Island of Lanai comprises about 2500 specimens; the largest amount of species of Lichens were found on that island. After a month's sojourn on Lanai the writer left the island for Lahaina on the "Nunulawe-leka."

a whaleboat carrying the U. S. mail between Halepalaua and Lahaina, Maui.

Through the courtesies of Mr. L. Weinzheimer, manager of the Pioneer plantation, in supplying men and pack mules, the writer was enabled to ascend the highest peak on West Maui, Puu Kukui, 5788 feet elevation. Camp was pitched at an elevation of 4200 feet on the edge of Honokawai gulch. From there the summit could be reached in four hours' walk through the swampy jungle. Puu Kukui is of greatest interest, its vegetation being of similar character to Waialeale on Kauai, elevation 5250 feet, which mountain the writer ascended the previous year. With the exception of the insect-eating plant *Drosera longifolia* and a new species of Composite, since described by the writer in the Torrey Botanical Club Bulletin, the flora is practically the same. Though several plants are peculiar to Puu Kukui as a violet, lobelia, and several others, the writer met with a great surprise in finding the Silversword, or Ahinahina of the natives, known from Haleakala and Mauna Kea, at the summit of West Maui, growing in a veritable pool. As the plant was not in flower it was impossible to determine if the same is a new species or not, but it may be stated that the same is an intermediate form of the green silversword from the western slopes of Haleakala and the well-known silversword from the crater and Mauna Kea. About 1000 specimens were secured on that trip. The writer returned to Honolulu the latter part of August.

On September 23 a trip was made to East Maui in compliance with instructions received to explore the slopes as well as the crater of Haleakala. The first camp was pitched near Olinda, at Mr. Fred. Harvey's survey camp. From there the forest of Hamakuapoko was explored as well as conditions permitted. The writer made his way from Waikamoi to Puohaokamoa and to the headwaters of Honomanu, where the jungle is dense and the vegetation exceedingly tropical. A large amount of material was secured at that locality.

The camp was then transferred to Ukulele Dairy, 1000 feet higher than Olinda. The upper slopes of Haleakala (whose vegetation consists mainly of shrubby, woody composites and geraniums, besides a large number of plants belonging to other endemic genera) were traversed in all directions.

On October 24, Mr. L. von Tempsky, Mr. Sam Baldwin and the writer descended into the crater and camped in Kaupo Gap for five days. The crater was crossed from Kaupo to Koolau and as much material as the short time permitted was collected. After the return from Koolau gap the flora of the Makawao forest and of Puukakae was investigated, yielding very interesting species, among them a species of *Samolus* previously collected only by Mr. Rydberg fifty years

ago. Only one tree was observed. The writer then went on to Ulupalakua, Dr. Raymond's ranch, where he made a study of the different eucalypts originally planted by Captain Makee. Auahi and Kahikinui, seven miles from Ulupalakua, where the writer stopped for twelve days, was the most interesting field ever visited by him on any island with the exception of Puuwaawaa, Hawaii. On an area of 350 acres not less than 47 species of trees were observed. Special mention may be made of one tree, declared extinct since the time of Hillebrand. This tree is allied to the Chinese Litchi, and is a delicious fruit, reaching the size of a large potato, and is worthy of cultivation. About 40 trees were observed, and mature seeds of the same collected; it is called Mahoe by the natives.

Regarding the stock-poisoning plants on Maui, particularly East Maui, the writer would advocate the extermination of one particular plant called Huamakani by the natives, a Passion vine (*Passiflora triloba*), which seems to spread rapidly and is also poisonous. The same if eaten by calves produces paralysis of the whole nervous system, brings on convulsions and constipation, high temperature, and finally death. Besides, on Maui, the plant is found plentifully at Kualoa, Oahu, at Mr. Swanzy's ranch.

PLANT EXCHANGE.

For a year the writer had been in correspondence with the leading herbaria of Europe and America and the different botanic institutions in the Orient and Australia. At present the Department has exchanged with the Sydney National Herbarium, New South Wales; Botanic Gardens, Ceylon, India; Botanic Gardens, Peradenya, Java; Herbarium, Bureau of Science, Manila, P. I., and Botanic Station, Mauritius.

The following institutions have consented to exchange:

Paris, Jardine du Plant; Tahitian flora.

Imper. Roy. Nat. Hist. Museum, Vienna; Samoan material.

Herbarium British Museum, London; Fiji material.

Botanic Station Taihoku, Formosa; Formosan plants.

Berkeley, California, Herbarium; California plants.

New York Bot. Gardens, Bronx Park; West Indian and Central American material.

Botanic Station, Sipbur near Calcutta; Indian plants.

Botanic Gardens, Singapore; Malayan plants.

The herbarium of the Board of Agriculture and Forestry possesses an almost complete collection of all the Eucalypts known, which is extremely valuable.

Of Hawaiian plant families the following have been submitted to the respective specialists.

Peperomia to Dr. Casimir de Candolle, Geneva, Switzerland.
Gramineae (grasses): Dr. E. Haeckel, Austria.

Cyperaceae (false grasses): Rev. Dr. Kuekenenthal, Attersee, Austria.

Lichenes, mosses, hepatics: Dr. A. Zahbruckner, Imp. Roy. Museum Nat. Hist., Vienna, Austria.

EUCALYPTUS INVESTIGATION.

The writer has made a special effort to straighten out the different species of Eucalypts growing in the Islands. On Tantalus material from 40 species and varieties was collected and forwarded to Dr. J. H. Maiden, Government Botanist, Sydney, Australia, the Eucalyptus expert, who kindly consented to identify the same for the Department. The diagnosis of over 20 species he has sent lately; of the remaining ones Dr. Maiden requested more complete material, which has been forwarded to him, as well as to Dr. Baker, who inquired if he could obtain specimens of the various species of Eucalypts cultivated in the Islands. The identification of the latter is still pending.

NATIVE SEED COLLECTION.

At Auahi, East Maui, the writer was enabled to collect about 15 pounds of seed of the following species:

Alectryon macrococcus Radlk. (Mahoe).

Ochrosia sandwicensis Gray (Holei).

Alphitonia ponderosa Hillebr. (Kauila).

Pisonia incrimis Forst. (Papala Kepau).

Maba sandwicensis A. DC. (Lama).

Dracaena aurea Mann (Halapepe).

Sideroxylon sp.? (Alaa).

Sample packages of seeds were sent to Dr. R. v. Wettstein, Director Bot. Gardens, Vienna, Austria, who consented to supply the Department with seeds of various Coniferae (pines) for the tree planting experiments on Mauna Kea and Haleakala.

Very respectfully

JOSEPH F. ROCK,
 Botanical Assistant.

homesteaders or persons owning plots of soil on which they
 did like to grow things ought to obtain a copy of the Bulletin
 "Peanut Growing in Hawaii," by Mr. F. G. Krauss, agronomist, which
 is No. 8 of the Hawaii Agricultural Experiment Station series.

REPORT OF THE COMMITTEE ON THE INTRODUCTION OF BIRDS INTO THE HAWAIIAN ISLANDS.

At a meeting of the Board of Agriculture and Forestry, held on November 21, the matter of the introduction of useful birds into Hawaii was brought up, and after a lengthy discussion the Board appointed Mr. E. M. Ehrhorn, Superintendent of Entomology, a committee to investigate and inquire into the possibilities of bird introduction. At last meeting Mr. Ehrhorn submitted the following report from Prof. H. W. Henshaw, who is too well known here to need an introduction and who now is the Chief of the Division of the Biological Survey, U. S. Department of Agriculture, Washington, D. C.:

UNITED STATES DEPARTMENT OF AGRICULTURE.

Bureau of Biological Survey.

Washington, D. C., Dec. 5, 1910.

Mr. Edward M. Ehrhorn, Superintendent of Entomology, Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii.

Dear Sir:—Your letter of November 22 requesting information as to the desirability of importing foreign birds into the Hawaiian Islands for the purpose of destroying noxious insects is received. In reply I have to state that the habits and standing of a bird in its native home never afford absolutely safe criteria from which to judge what it may do in a foreign country where its habits may change considerably; hence, the importation of any species must always be regarded as an experiment to be carefully watched till the bird has become well established in its new home and its habits there thoroughly known.

It may be set down as an axiom that the introduction of birds, in large part seed and fruit eaters, into any agricultural country is to be avoided, since both birds are almost sure to prove a nuisance by attacking fruit and grain crops. The English sparrow is a well known instance of the harm that may come from the introduction of a natural seed eater, only to a comparatively small extent insectivorous, into the United States. Although introduced also into the Islands, this bird has apparently not thriven and increased there as it does in a colder climate, and hence so far has done comparatively little harm. Much the same statement applies to the California house finch now domiciled in several of the Islands. It is a serious nuis-

ance in parts of California because it destroys large quantities of small fruits, and in time it may become a nuisance in the Islands.

Neither the bobolink nor any species of blackbird should be considered for a moment as a candidate for introduction. The former is a pest to the rice planter. In 1880, when the rice crop of South Carolina was valued at upwards of six millions of dollars, this bird it was estimated destroyed at least one-third of the crop, to the value of two million of dollars.

The Brewer's blackbird might possibly prove an exception to the rule, but it is exceedingly gregarious in fall and winter, and any birds that assemble in large flocks are to be regarded with suspicion as they are capable of inflicting great damage on crops when they turn their attention to them.

I can see no harm likely to result from the introduction into the Islands of any of the small spotted woodpeckers, as for instance, Gairdner's woodpecker (*Dryobates pubescens gairdneri*), and Nuttall's woodpecker (*Dryobates nuttalli*), both of which birds might be obtained in California and both are very useful.

So far as scale insects are concerned, and other small insect pests, I can unreservedly recommend any of the chickadees, as the plain titmouse (*Baeolophus inornatus inornatus*), mountain chickadee (*Penthestes gambeli gambeli*), California chickadee (*Penthestes rufescens neglectus*), the bush-tit (*Psaltiriparus minimus minimus*), also the wren-tit (*Chamaea fasciata fasciata*). Both the latter species abound near San Francisco. I should not hesitate to recommend also any of the flycatchers, or phoebes, like Say's flycatcher (*Sayornis sayus*), the black flycatcher (*Sayornis nigricans*) of California, and the ash-throated flycatcher (*Myiarchus cinerascens*). These three species are, it is true, migratory, and it is by no means certain that they would forego the migratory instinct and consent to remain in the Islands. On this account it would be better to select tropical non-migratory flycatchers, as species of the genus *Myiarchus*, *Pitanga* and *Myiozetetes*, all of Mexico. The Vermilion flycatcher of Texas, Arizona and Mexico, besides being very beautiful, is an active flycatcher living much in rather open places and is non-migratory over much of its range. The little Australian flycatcher you mention might also prove a very desirable inhabitant of the Islands, and it is very likely to thrive here, as the little flycatcher, or elepaio, now dispersed over the islands of several of the Islands was probably derived originally from Australian stock.

Any species of swallow or nighthawk could be introduced with perfect safety and with the certainty of yielding valuable service, since these birds live almost exclusively on insects. Unfortunately our American species are migratory, but the purple Martin of northern Mexico is non-migratory, is a greedy insect eater, and would be rather easily obtained and transported, es-

pecially when young. The same statement may be made of a tropical swallow living on the coast of Mexico (*Tachycineta albilinea*). I should personally like to see an attempt made to introduce one or more of the several species of California humming-birds into the Islands, although the desirability of doing this rests more upon aesthetic than economic grounds. They live to a considerable extent upon minute insects which they find within the corollas of flowers, and also upon the nectar of flowers. I do not doubt for a moment that they would thrive wonderfully well in the gardens about Honolulu, and also in the mountain districts where the Ohia abounds, the flowers of which would furnish them an abundance of food. Nor do I see any difficulty in the way of transporting them by steamer to Honolulu, as they could be fed upon water sweetened with sugar during the six days of the voyage.

An attempt to acclimatize the mocking bird in the Islands would be sure to arouse popular interest, would probably be successful, and would be attended with comparatively little risk. It is almost exclusively insectivorous during the breeding season and largely so the year round. The mocking bird would be a fine addition to the Island avifauna, though it cannot be recommended unreservedly.

There is another bird which I think worthy of trial, about the size of a blue bird and known to dealers as the "Pekin nightingale" or "Japanese robin." Its scientific name is *Liothrix lutea* and it is somewhat related to the thrushes, but is probably nearer the flycatchers. It lives to some extent on small fruit and insects. It would be easy to obtain this bird from San Francisco bird dealers. There are a good many wild berries in the Islands, including the native blackberry or akala, the introduced Jamaica raspberry, the introduced mulberry and the native species, together with a number of berry bearing trees, the names of which I have forgotten. These should furnish abundant food for such berry eaters as the ones just mentioned, and would greatly lessen the chance of their attacking cultivated ones.

The game birds, like the turkey, pheasants and quail, so far introduced into the Islands, have suffered from the mongoose, since they nest on the ground, and, together with the native Hawaiian goose, are likely to ultimately undergo practical extermination. Should further introduction of game birds into the Islands be contemplated, I would suggest trial of the following, all inhabitants of Mexico: Chachalaca (*Ortalis*), guan (*Penelope*), and curassow (*Crao*). These gallinaceous birds are to a considerable extent forest inhabitants, would furnish excellent sport, and are fine eating. The curassow would probably thrive best in humid regions, the chachalaca in dryer parts. All these are tamed readily, and in Mexico frequently live about the houses of the residents, mingling freely with the domestic fowls. They

feed on wild berries and insects, and *nest well up in forest trees*. This latter fact makes them particularly good subjects for trial in the Islands, as they would be largely exempt from attacks by the mongoose.

It is impossible to predict beforehand the probable results of an attempt to establish the foregoing species in the Islands, though I see no reason why any of them, except the migratory species which are doubtful, may not thrive there. Sometimes, however, two or three attempts to establish a species in a foreign country have to be made before the bird is finally acclimatized. It may be said that the general history of efforts to acclimatize birds in foreign parts shows many more failures than successes. It has always unfortunately proved easier to secure and import the hardy seed eaters, which can be bought in almost any bird store, than the more delicately organized insectivores, which explains largely why so many disastrous importations have been made in different parts of the world. The introduction of really useful species, on the other hand, cannot be attempted without entailing considerable expense and trouble. Hence the rarity of properly conducted experiments.

Should attempts be made to import into the Islands any birds from California, I would suggest that you can probably obtain all necessary information as to where they can best be secured from Mr. Joseph Grinnell, of the Museum of Vertebrate Zoology, University of California, Berkeley. I have no doubt that Miss Annie M. Alexander, Oakland, California, through whose generosity the museum has been established, would take great interest in the matter. I shall be glad to supply any further information on the subject or to aid in any way within my power.

Very truly yours,

H. W. HENSHAW,
Chief, Biological Survey.

CORRECTION: In the reports of the Superintendent of Forestry on following pages in reference to changes of boundary in the Kau, Hawaii, and West Maui Forest Reserves, the table showing ownership of lands in the Kau Reserve (p. 71), should read as follows: Kaalaala-Makakupu Tract, Govt. (Lease No. 555), Keaiwa—Hawn. Agricultural Co.

On West Maui the proposed forest planting is to be done by the Wailuku Sugar Co., not by C. Brewer & Co.

SOUTH KONA FOREST RESERVE.

On December 28, 1910, the Board of Commissioners of Agriculture and Forestry approved the recommendations of the Superintendent of Forestry that certain forest lands in the District of South Kona, Hawaii, be declared a forest reserve. There follows the report of the Superintendent of Forestry, setting forth the reasons why this action should be taken. The date of the public hearing in connection therewith is January 28, 1911.

REPORTS OF THE SUPERINTENDENT OF FORESTRY.

Honolulu, Hawaii, November 21, 1910.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have to submit a report with recommendations in regard to the creation of a forest reserve in the District of South Kona, Island of Hawaii. The area proposed to be set apart includes the greater part of the section of forest land from the land of Waiea to and including the land of Manuka, just over the boundary line in the Kau District, lying between the upper limit of the area that has been cleared for agriculture and the boundary of the land of Kahuku, well up on the slope of Mauna Loa. For convenience in description this proposed reserve has been divided by the surveyor into two sections, Waiea-Kipahoe and Kapaa-Manuka. These are separated by a block of privately owned land, in part homesteads, that it is not deemed advisable to include at present in the proposed reserve. For these two areas I propose the name South Kona Forest Reserve.

The proposed South Kona Forest Reserve is made up of both government and privately owned land. The total area is 50,612 acres. Of this, 31,730 acres, or 63 per cent., belongs to the Territory. A considerable part of the government land (13,915 acres) is not under lease, so that it can be set apart at once unconditionally. The remainder will come into the fully reserved class upon the expiration of the existing leases. So far as it has been possible to ascertain, the owners of private lands within the proposed reserve are generally in favor of the forest policy of the Government and intend to manage their holdings in general conformity with the plans proposed by the Territorial Government. In particular, the Bishop Estate, owners of the land of Kapua, have already, in a recently executed lease, made provision for the reservation of the forest on that land within the boundaries recommended in the present report. As elsewhere in the Territory, the pri-

vate owners in South Kona are unwilling to turn the management of their lands over to the Government until a definite system of administration has been inaugurated.

The accompanying table, compiled along with the technical description by Mr. Geo. F. Wright, when in the employ of the Territorial Survey Office, gives the ownership and area of the lands in the proposed reserve.

The boundaries of the South Kona Forest Reserve have been so drawn as to include practically all the valuable forest still belonging to the Government in South Kona, with such private tracts of like character as lie between the strips of Government land. From a glance at the map showing Government holdings it will be seen that with the exception of one or two small pieces in the center of the district, the Government lands in Kona are pretty much together at the south end. But they are not in a continuous block, being instead a series of strips, alternating with other lands of varying width in private ownership.

The main Government road in South Kona runs at an elevation of from 1200 to 1500 feet, gradually rising toward the south. The lower edge of the woods, which is also the upper line of the land that has been cleared for agriculture, is a little less than 2000 feet in elevation from Waiea to Kipahoe. On the latter and also on Kalanamauna and Manuka in Kau, the forest comes farther down. But these three last named lands are covered in large part by old aa flows, so that, except in kepukas of varying size where the soil is good, there is little agricultural land. The forest, principally of Ohia Lehua, grows on the aa flows. As much of it is of excellent quality, the makai line of the proposed reserve has been brought down below the Government road to include these stands.

The upper boundary of the reserve follows the boundary of the great land of Kahuku, which is in private ownership. The elevation varies from 5000 to 6000 feet. Above the boundary on Kahuku are a considerable number of groves of small sized Koa trees, and also an open stand of short and scrubby Ohia, that extends well up onto the slope of Mauna Loa. There is, however, little or no forest of commercial value on his portion of Kahuku, which is to be ranked as indifferent grazing land.

The forest in the proposed South Kona Forest Reserve consists of two sharply-defined belts. From the lower boundary up to about 4000 feet, Ohia Lehua is the predominant tree, in mixture with others of the less important native species. In spots and strips, especially toward the south end of the district, usually on old aa flows, are pure stands of Ohia, of good size and height and excellent quality. The trees in these stands are usually from 8 to 24 inches in diameter

breast high and from 80 to 100 feet tall. Unfortunately these good stands are all limited in area. No exact survey of them has ever been made nor any careful estimate as to the yield per acre.

Above the elevation of 4000 feet throughout South Kona—and the line is sharply marked—is a belt of nearly pure Koa. The trees are of good size, from 3 to 5 feet in diameter, and of fair height, 60 to 80 feet. This belt is approximately a mile wide. The large trees do not extend much above 5500 feet in elevation. Above that, on Kahuku, the forest is of the character already described.

At the extreme south end of Kona and on Manuka there is a small section of great botanical interest, in that here are found trees and shrubs that occur only in one or two other places in Hawaii. This area is similar in character but not as large as the section between Puuwaawaa and Huehue at the north end of the Kona District.

It is unfortunate, but true, that throughout the Kona District there are no streams and only a few springs that actually deserve the name. In the proposed South Kona Forest Reserve special attention was paid to locating all the known sources of water, and Mr. Wright's original map shows the various waterholes. As a whole, this forest is unexplored. For fifteen miles along the coast from Waiea to the Kau line, not more than eight trails go through the forest, and these are of the roughest sort and almost impassable in bad weather. With such inadequate means of access it is impossible to do much more than fix the outside boundaries of the forest. A more intimate knowledge of it must be left till later. Personally, I have seen as much of South Kona as is now feasible without the cutting of special trails. This report is based on observations made during several visits at different times, as well as upon additional data secured by Mr. Wright at the time he fixed the forest boundaries.

OBJECT OF THE RESERVE.

The purpose of creating the South Kona Forest Reserve is essentially to bring these government forest lands under the department of the Territorial Government especially charged with caring for the forests, in order that plans for their wise use may be more easily and effectively be put into execution.

It goes almost without saying that the first need in South Kona, as in other Hawaiian forests, is to safeguard in an adequate way all the present known sources of water, and also such localities as give promise of being possible of development. These areas should be kept permanently under a dense forest cover for their chief value is as producers of water.

In South Kona, however, the chief value of the forest rests in wood rather than water. It is one of the few forest areas in the Territory where the Hawaiian trees have commercial value for lumber and where it is advisable that the forest be looked upon as a producer of wood rather than primarily as a protective cover. In earlier reports I have made clear the distinction between "protection" and "commercial" forests, and have done all I could to establish it as a policy that wherever water was to be got, the right thing to do was to hold the area strictly intact as a "protective forest."

Now, just as most of our already established forest reserves, especially on the windward side of the islands, are of the protective class, so the proposed South Kona Reserve stands as a type of the commercial class. Judiciously handled I believe that when the right time comes, this forest should be logged, provided, of course, that the work is done under careful restriction and in accordance with forestry methods. This can best be accomplished if the area is set apart now as a forest reserve.

It is not necessary at this time to go further into the matter of how logging operations should be conducted. If the lands are set apart now, plans for the wise utilization of the timber on them can follow. It need only be said here that in all such work the ultimate object is to put all the land to the best use. If some of the area now under forest proved to be agricultural in character and was so located that it could be opened up to advantage, the policy of wise use would require that it be taken out of the forest reserve and so developed. If it were found to be land that because of its character can produce trees better than other crops, or that for other reasons was more needed in forest, the thing to do is to manage the forest so that one stand of trees may be succeeded by another. This area, set apart as a forest reserve, will be in a position where plans for its wise use—be it by protection or by conservation utilization—can more effectively be put in force.

Believing, then, that the best interests of the Territory will be served by the setting apart of these lands as a forest reserve, I do now recommend that the Board of Agriculture and Forestry approve this project and call upon the Governor of the Territory to hold the required hearing and thereafter, by proclamation, to create the South Kona Forest Reserve.

Accompanying this report [but here omitted] is the technical description of boundary, illustrated by blueprint maps prepared by the government Survey Office.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

LIST OF LANDS INCLUDED IN THE SOUTH KONA FOREST RESERVE.

(Waiea-Kipahoe Section)

Name.	Owner.	Area.	Lessee.	Lease Expires.
Waiea.....	(Government)	1,260		
Honokua.....	(Hui Land)	7,950		
Haukalua-Pahoehoe				
Tract.....	(Government)	1,210		
Pahoehoe 2nd.....	(Ontai Bros.)	1,485		
Kaohe Tract.....	(Government)	1,555		
Kaohe 4th.....	(W. R. Castle)	760		
Kukuipae Tract.....	(Government)	2,760		
Olelomoana 1st.....	(W. R. Castle)	810		
Olelomoana-Opihihali				
Tract.....	(Government)	3,885	572-Gouveia and Ontai, June 9, 1926.	
Kaapuna.....	(Ontai Bros.)	1,755		
Kipahoe Section.....	(Government)	4,590		
		<hr/>		
		28,020		

(Kapua-Manuka Section)

Name.	Owner.	Area.	Lessee.	Lease Expires.
Honomalino.....	(Government)	2,540		
Kapua.....	(Bishop Est.)	6,122		
Kaulanamauna.....	(Government)	2,060	504 - Waiohinu Ag. & Graz. Co., Sept. 20, 1918.	
Manuka.....	(Government)	11,870	534 - Hutchinson S. P. Co., Sept. 11, 1911.	
		<hr/>		
		22,592		

Total area of the South Kona Forest Reserve: 50,612 acres.

CHANGES OF BOUNDARY IN TWO FOREST RESERVES.

At the meeting of the Board of Agriculture and Forestry held on December 28, 1910, two reports by the Superintendent of Forestry, recommending changes of boundary and the consequent slight enlargement of two established forest reserves, were approved. The reserves are the Kau Forest Reserve in the Kau District, Hawaii, and the West Maui Forest Reserve, in the District of Wailuku, Maui. The reports, which explain themselves, are as follows:

WEST MAUI FOREST RESERVE.

Honolulu, Hawaii, November 26, 1910.

Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii.

Gentlemen:—I have to submit as follows a report recommending that a small additional area be added to the West Maui Forest Reserve. The land in question is the remnant of the Government tract known as Polipoli, Waiehu, District of Wailuku, Island of Maui. Its area is 42 acres; it is not at present under lease. The area embraces the bare ridge between the ilis of Ahikuli and Hananui, belonging, respectively, to the lands of Waiehu and Waihee, above the Waihee Irrigation Ditch of the Wailuku Sugar Company. The remainder of Polipoli, below this ditch, was recently sold (Grant 5279) to C. Brewer & Co., Ltd.

The land is so situated as not to be available for agriculture, and from its character is of little value for any other purpose than growing trees. It is one of the areas of Government land that will serve the people of the Territory best by being again brought under forest. The purpose of adding it to the West Maui Forest Reserve is that this may the more readily be accomplished.

With Polipoli a definite proposition exists, as follows: Messrs. C. Brewer & Co., as a part of a general scheme for reforesting the bare slopes above the Wailuku Sugar Co.'s holdings, have offered to plant and care for a forest on this land of Polipoli if the Government will set it apart as a forest reserve. The existing West Maui Forest Reserve touches this remnant of Polipoli at its mauka end, so that the action now proposed is in effect merely an extension of boundary.

As the land is of more value for forest than for any other use, I believe this offer is one that should be taken up. Accordingly I recommend that the Board of Agriculture and Forestry approve this project and call upon the Governor to sign the proclamation necessary officially to add Polipoli as an addition to the West Maui Forest Reserve.

The following description, made up by the Government Surveyor, is submitted:

Superintendent of Forests,
Territory of Hawaii

KAU FOREST RESERVE.

Honolulu, Hawaii, November 28, 1910.

Board of Commissioners of Agriculture and Forestry, Honolulu, Oahu.

Gentlemen:—I have to submit as follows a report recommending that the boundary line of the Kau Forest Reserve, in the District of Kau, Island of Hawaii, be so modified as to include a small additional area of land that for the best interests of all concerned should be under forest.

When the Kau Forest Reserve was created by proclamation of Governor G. R. Carter, on August 2, 1906, this section of the boundary was drawn between fixed points, with the understanding that the actual line on the ground should follow a flume that roughly paralleled the line of which at that time it was not possible to obtain a technical description. Recently, at the expense of the Hawaiian Agricultural Company, a survey of this flume has been made by Mr. A. C. Alexander, C. E. The present action is, therefore, in effect, to substitute a detailed technical description of the line for the one or two simple courses between points. As the flume is somewhat makai of the former line, some 216 acres are added to the reserve.

The area proposed to be added to the Kau Forest Reserve consists of four strips, aggregating altogether 216.2 acres, being parts of the following lands:

Kaalaala-Makakupu Tract:	Govt. (Lease No. 637)	82 acres
Keaiwa:	Bishop Estate	23 "
Kaauhuhuula Tract:	Govt. (Unleased)	109 "
Palima:	Govt. (Lease No. 591)	2.2 "
		<hr/> 216.2 "

The Government lands are in part now under lease to the Hawaiian Agricultural Company, at whose request the proposed change of boundary is made. One of the leases expires in 1911, the other in 1918, but both carry the "withdrawal-for-public purposes" clause, so that the reservation can go into full effect at once.

The object of the Kau Forest Reserve is to protect the forest cover on a section from which water is developed for use on the agricultural lands below. The addition of the land now under consideration will enable the objects of the reserve the better to be accomplished, particularly in making a boundary that can more easily be policed.

For these reasons, I do now recommend that the Board of Agriculture and Forestry approve this project and request the Governor, after the required hearing, to set apart as an addition to the Kau Forest Reserve the area embraced in the accompanying technical description.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

MECHANICAL POWER FOR THE FARM.

One of the interesting features of the land show in Chicago last month was mechanical power for the farm. This took the form not only of the tractors themselves, but was supplemented by a daily illustrated lecture on the economic advantages of plowing and doing other farm work by means of engines instead of horses. The lecture was not a recital of the joy to be derived from a "seeing of the wheels go 'round," but a consideration of mechanical power strictly as a business proposition. There was a time when the farmer was not classed as a business man. Today he is not only more a producer than the manufacturer, but his range of products is such that the volume of his sales compares favorably with those of many country merchants. In his crop production and delivery for shipment he has come to the point where he can use power-driven machinery to quite an extent, and we may reasonably anticipate in the next ten years a large demand for traction power by farmers, especially those operating several hundred acres. We will come to this through the use of automobiles, which farmers are now buying by thousands.

Some of the records cited are interesting. For instance, on the big Dakota farms where the plowing, seeding, harvesting, threshing and hauling, all are accomplished with engines, the cost is reduced \$2.10 per acre. Plowing which formerly cost \$1.35 with horses falls to 76 cents with power; pulverizing, from 63 cents to 17 cents; and hauling, from \$1.00 to 26 cents per acre. The final results are stated to amount to a net saving of 10 cents per bushel, or about 5 per cent. on the cost of a 600-acre farm.—H. H. Windsor in the January Popular Mechanics Magazine.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection and growing.

The list includes both forest and ornamental trees, such as Silk Oak, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 1 to 50 cents per ounce. The seedlings may be had for 2½ cents each except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed David Haugh, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter always write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 20 HONOLULU, HAWAII.

EDW. M. EHRLHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

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THE RUBBER CONVENTION.

On January 23, 1911, there was held in Honolulu, in the rooms of the Chamber of Commerce, the fourth annual meeting of the Hawaiian Rubber Growers' Association. A number of interesting papers were presented dealing with the progress of rubber production in this Territory, the present status of the industry, and the outlook for the future. Several of the papers were followed by discussion.

On account of the importance of Rubber as an industry in Hawaii, it is only fitting that the Forester should contain a full account of this meeting. In this issue are given, practically in full, the several addresses and much of the incidental discussion. It is therefore not without reason that the cover of this issue bears the caption "Rubber Number."

A CORRECTION.

Through a regrettable oversight in proofreading, the word "not" was omitted in the January Forester from one paragraph of the address of the Hon. Marston Campbell, in such connection as completely to change the meaning. The error occurs midway on page 3. What Mr. Campbell really said was: "If we limit our efforts to the commercial side of forestry, we will 'not' attain the great end of conserving our several natural resources which are dependent upon forest cover. Our great need is in forest cover whether it be forest planted for commercial ends or cover which will preserve the land against erosion."

NOTICE TO PUBLIC SCHOOL PRINCIPALS.

Through an arrangement between this Board and Mr. Willis T. Pope, Superintendent of Public Instruction, the principals of all public schools throughout the Territory have been placed on the mailing list of the Forester, so that during the remainder of this school year they will receive the magazine regularly. Almost every issue of the Forester contains articles that should be of value to teachers in some branch of their school work. It is hoped that the teachers will find it so.

It is the desire of Mr. Pope, in order that the various numbers may readily be referred to, from time to time, to have the file of the Forester kept in the school library. This notice is here inserted at Mr. Pope's request. Principals will please give the matter their attention.

COWPEAS AND THE FARMER.

Progressive farmers are just beginning to learn the value of cowpeas. Agricultural experts in the experimental stations and colleges in the United States, after years of study, virtually have decided the humble leguminous plant is one of the best friends of the farmer, rich or poor. The value of the cowpea has been demonstrated recently in agricultural literature.

Perhaps the latest publication on the subject is that of M. F. Miller, professor of agronomy in the College of Agriculture at the Missouri State University, who has just issued a bulletin on the seeding of cowpeas. The agriculturist says the great value of cowpeas as feed and a soil-renovating crop, which is now universally known, should give them a more important place in agriculture.

The short period of growth of cowpeas makes it possible to use them to great advantage as a catch crop between the regular crops in the rotation, either for hay, for pasture or for turning under, says Prof. Miller. They are, therefore, especially fitted for the man who wishes to build up land rapidly while he is at the same time securing a return from it in feed. The crop is one which will undoubtedly become of much greater importance, as the land is farmed more extensively.

*FOURTH ANNUAL MEETING HAWAIIAN RUBBER
GROWERS' ASSOCIATION.*

On January 23, 1911, in the rooms of the Chamber of Commerce, in Honolulu, was held the Fourth Annual Meeting of the Hawaiian Rubber Growers' Association. After opening remarks by the President, Mr. F. L. Waldron, Mr. W. A. Anderson, manager of the Nahiku Rubber Company, was called upon for an address.

ADDRESS OF MR. W. A. ANDERSON.

Mr. Anderson's subject was the "Results of Tapping." His address, in part, is as follows:

"We had very little data on the commercial tapping of Ceara trees, because practically no work had been done, and therefore we started more or less independently at the beginning. At present, however, there is quite a good deal of tapping of Ceara trees in South America and South Africa, reports of which are available from time to time, and they are of assistance to us.

"We are now tapping Ceara trees by making a vertical channel up to a height of about five or six feet, the spout being inserted at the bottom. Then on one side we make diagonal cuts about six inches apart, beginning at a point six inches above the spout and leading into the vertical channel. On the other side of the channel similar vertical cuts are made half way between those first made, each cut extending a quarter of the way around the tree. In this manner one-half the circumference of the tree is being tapped. At the next tapping these diagonal cuts, but not the vertical channel, are pared on the lower side, removing a strip of bark about a third of an inch wide. At the third tapping this new cut is pricked along its upper edge, and at the fourth it is pricked along its lower edge; after which it is again pared and pricked in the same manner, so that one paring is followed by two prickings, making one paring in every three tapplings.

"This system was evolved after trying paring alone, pricking alone and pricking at the same time. Pricking is more rapid than paring and gives larger returns for a given amount of labor. The paring alone gives a profitable yield. The fewer parings, as compared with the number of prickings, the better, and while the paring alone gives a profitable yield, the pricking done as described gives a better yield. After the outer bark has been removed a new and tough bark soon forms, which makes pricking alone unprofitable in a few weeks after the bark is removed.

FOR BEST RESULTS.

"For best results, tapping should be done during the first few days after the bark is removed, for the reason that otherwise the latex cells appear to dry up with the action of the air and soon wither. If the trees are not tapped during these first few days, they should not be tapped till after several weeks. Hence, before the tree can be thoroughly tapped, the new bark will have reached the stage where pricking can not well be accomplished. For this reason, removing the bark by paring over a space only wide enough to prick in the next two or three days, proves better than removing all the bark at once and then trying to prick for a long series. Also, by using the paring knife as above described—not going too deep—profitable tapping is made while removing the bark.

"Of course, objections have been made to pricking, but objections have also been made by good authorities to paring, and would be made to any method of extraction. The only course open to us is to find the method that looks best and, if it has not already been proven objectionable, use it until it is shown to be so. It was thought at one time that pricking was responsible for injury suffered by some of the trees in a series of tapplings last year, but later experience has brought the conviction that not the pricking, as pricking, but the removal of bark at that time, was chiefly responsible, aided, no doubt, by the rather severe tapping that closely followed.

"The system outlined here may be rather severe. In a herringbone with diagonals only six inches apart, the top of one cut extends above the lowest point in the cut above the lowest point in the cut next above it, and for this reason must interfere somewhat with the horizontal movement of materials in the bark. This objection, however, would be stronger in the case of the vertical cuts, and as the flow of materials in the bark is chiefly up and down or diagonally across, it is rather difficult to determine what strength this objection would have. Also, since the paring is to be followed by pricking, the former is not as deep as it otherwise would be, and therefore does not interfere with the circulation of latex so seriously as it might otherwise. The paring alone is expected to get all the latex. These close cuts have been made for several months, but not yet long enough to determine whether they might be injurious. Of course, the chance of injury may be lessened by the avoidance of too frequent tapplings.

TAPPING INTERVALS.

"The yield from a given tree appears to increase for the first six to twelve tapplings, after which it decreases somewhat till a point is reached where it remains about constant. The word 'tapping' includes the pricking too. Hence, a series of six, nine or twelve tapplings may well be followed by a rest. For instance, if the yield diminishes after six tapplings, it might be well to rest it. Probably twelve tapplings should be made. We have found that a rest of a week is sufficient at some periods. In this way we remove all the bark we can. If we start from the tree, our next two parings will remove that portion, and then the next time we take off some more bark, when pricking comes immediately after the removal of the bark. This pricking takes place as soon as the bark is removed.

"If a third of an inch is removed at each paring, then in three parings, or nine tapplings, one inch of bark will have been removed, and there is plenty of authority for advocating a rest at this stage. We have found that a rest of a week or ten days is sufficient, and then we start again and get about the same result. At this rate, also, fifty-four tapplings will take off all the bark between adjacent cuts. Therefore, tapping for one week and resting for three weeks would remove all the bark on one side of the tree in about six months, when it must be rested before beginning on the other side.

"The more rubber we get from each tree at each tapping, the more economical the tapping. After the bark on one side of the tree has been removed for tapping, after six months' rest we would go around to the other side of the tree. It has been found by the experiment station reports and observations that if the tapping is carefully done and not too deeply, it will renew in less than a year. It is only in certain points and when the pricking is too deep, that swellings on the wood are caused. If the pricking is carefully done, it does not swell, but the pricking does go into the most prolific cells, while in order to get in there with the knife we would have to cut deep, because the bark is so thin. Thus far we have not found satisfactory knives.

ALTERNATE TAPPINGS.

"A movement is on foot, and growing, in the Far East, to limit tapping operations in any one year to a quarter or a third of the tree, instead of to a half, as heretofore, thus giving three years instead of two for the tapping surface to be renewed. This might well be considered by us, in which case, instead of the full herringbone, going half around the tree, the half herringbone going one third around, might

COAGULATION PROBLEMS.

"The most interesting problems to be solved in the future of rubber planting, are those in connection with improved methods of coagulating the latex and curing the rubber, and those bearing upon the possible relation of fertilizers to the latex yield.

"Not only have tapping knives been invented and successfully used, that we have never seen and probably have never heard of, but several machines and processes have been invented for smoking either the latex or the rubber. Smoked plantation rubber is quoted at about ten cents per pound higher than the best unsmoked. This additional ten cents per pound may some time mean to us the difference between profits and no profits, and in any case will mean additional income at comparatively little cost. Besides this, the first factory is just being planned, and for this alone two machines which are unquestionably essential have been ordered—a washing machine and drying apparatus. To equip this factory to the very best advantage, it will not be sufficient to have observed one or two successful factories in operation; one should know all the improvements that have been made since these successful factories were erected.

ALL EXPERIMENTAL.

"The making of rubber plantation machinery is in its infancy, and for that reason every advance is likely to be a big advance. Our factories, when built, should be of the highest possible efficiency, for only by the use of machinery in its highest point of efficiency and economy can we hope to overcome the handicap under which we are placed by local labor conditions. It would be folly to sit at home and hope we may start at the beginning and work out the problems that others have already gone far in solving. We should learn all the others know and then improve on their accomplishments. For this reason I believe this association, if this is the proper medium for joint action by all the plantations and planters, should send some one to the London exhibition next summer. Here all the rubber machinery in the world will be represented, and especially the products of English manufacturers who have for several years specialized in plantation machinery. These will not only be exhibited, but demonstrated, and no better opportunity could possibly be offered, or more timely for us.

"It seems to me we should send some one familiar with the problems here, who can adapt to our local conditions what he learns from the discussions and exhibits there. He can there obtain the best the world affords in tools for tapping and

curing our product. I believe the person should have some authority to purchase, for he might find just the knife we require to overcome our difficulties or he might find just the pricker we need, and if so, should be able to purchase in such quantities as to enable us to use them at once. This would also enable us to get the best possible equipment for our factories. Were he to wait until his return home and make his report for directors to act upon before orders could be given that must be filled in England, delay of months would ensue, while, should he order on the ground, the goods might arrive nearly as soon as he did. Purchases have got to be made anyway, and why not go shopping to the one place where all there is to choose from can be seen at one time. He will be able to compare prices.

"The members of the Association have spent in the neighborhood of \$300,000 to bring the industry to its present state, where the trees are ready to give their product; \$1000 more, or whatever it might cost to insure the making of this product as valuable as possible, would be well spent. The factory now under way, and all that may hereafter be built, should have a suitable apparatus, whatever it may prove to be, or at least the most suitable yet discovered or invented for properly smoking its rubber, if by so doing it can obtain ten cents per pound more for that rubber, or even three cents per pound more.

"Reports are just now coming to hand of the invention of a successful machine for doing chemically what the smoking process used in fine hard Para does. The late Mr. W. W. Hall had this in mind when he suggested to me several years ago the use of prorigeneous acid for the purpose. If this machine is all that it is hoped it will be, we should have it, if it is adaptable to our product. The only way to learn whether it is, is to see it work.

DRYING APPARATUS.

"We have found that we shall need some sort of artificial drying apparatus. If the rubber is kept for any length of time exposed to the air, a mold forms on it and it takes anyway three or four weeks to dry the rubber out there, and for that reason the rubber company has come to the conclusion that it is wise for us to invest a little money in a vacuum dryer for the reason that we are not ready at this time to spend money on expensive machinery.

YIELD PER TREE.

"Our trees yield about a pound of rubber from one hundred trees at a tapping, or at one hundred tappings from the same

tree. We find trees that are not more than ten inches in circumference that will give a profitable yield, while some sixteen-inch trees do not give a profitable yield. We find, too, that removing the bark all at once is apt to injure the tree, but we will probably try to find some way of removing all of the outside bark at once. This knife does very good work cutting through even the original tough bark as well as the new bark that might form.

"We have over 1200 trees and I think it will work out to tap about nine times and then rest the tree for a week.

"We cannot tap one tree one hundred times in a year unless we make our cuts wider than this. Of course, if we made our tappings twice as far apart, we would get twice as much rubber. We may find that it will be wiser in the long run to make our tappings farther apart. I do not think that we shall want to tap all the year around. The trees should be rested from the first of February until the first of May. It will probably be found wiser to tap the tree nine times and then rest it for three weeks and then make another tapping, in which case we remove one inch of the bark. By this scheme we make eight or ten cuts each side of the channel, and that makes sixteen or twenty cuts on the tree. Of course, the expert will prick a great many more than he will pare. We select the more skillful ones for the tapping. We are not using any acid. We tried a scheme that I believe is being used in South Africa. We found the same difficulty there that we found in trying to grow without paring. I am firmly convinced that more or less injury is done to the tree every time the bark is taken off. The scheme that we have now adopted avoids that difficulty."

PAPER BY MR. L. F. TURNER.

After the conclusion of the discussion following Mr. Anderson's paper, Mr. L. F. Turner read an address on "Cultivation of Rubber Trees and Its Results." It was as follows:

"I have been asked to prepare a paper on Cultivation and Soil Conditions. I presume that the request refers entirely to rubber culture, as it is to be read at a convention of rubber planters.

"Several conditions are necessary for success, with rubber as with all other crops; we must have soil to cultivate, and we must cultivate the soil; to a reasonable extent at least. To this may be added that heat and moisture and proper climatic conditions are also essential. This much will be conceded by all, and then—each man has his own opinion of what cultivation means.

Different conditions require different methods of treatment; each manager probably recognizes that the stirring of the soil

is of prime importance; each one knows that the roots of the trees must not be cut; and the benefits of fertilizers have been so thoroughly demonstrated that they need no further argument. How best to accomplish the cultivation with the utmost benefit to the trees, and at the smallest expense, is the problem to be solved, and perhaps the best way to get at it is for each of us to speak of our own conditions, and compare results.

"Puna is preëminently a volcanic district; its soils are, with the exception of the organic matter on the surface, entirely of volcanic origin; every process of the change from rock, or sand, to fertile soil, is here laid before us as an open book. The abundance of moisture combined with the warmth of the climate, and its freedom from winds, gives surpassing fertility, and the old saying: 'Everything grows in Puna,' is more than borne out by the results spread out before us on all but the most barren rocks; and even among those trees and bushes are springing up, and in some parts dense jungles of lauhala are growing almost to the water's edge.

"The enormous flows of pahoehoe and aa, the outbursts of sand and ashes are everywhere apparent, leaving no doubt whatever as to the agencies that have been at work to produce the present conditions. Layers of pahoehoe over deep soil show that fertile land has been covered, and speak either of the vast time that must have elapsed to produce this soil, or of alternate outbreaks of sand and ashes and of lava. And with the exception of the 1840 flow, which came from Kilauea, and the legend of Pele chasing the chief who had bested her in a game, there is no record, no tradition of activity in any of the numerous craters in this portion of the district.

"The action of rain on the sand and ashes beats down the surface and then, a little lichen or moss, a few ferns or shrubs, and vegetation has commenced, and the decaying vegetation combined with the moisture from the atmosphere, quickly absorbed by the sand and ashes, forms the beginning of a soil which deepens and increases in richness, until in some cases it becomes almost a muck. Such are the soils of our better lands, our arable lands.

"The grinding and wearing of the rocks as they rolled or were pushed along, a filling-in of some of the crevices by weathering; the above processes repeated, followed by the further breaking-down, disintegration, and decomposition of the rocks by the roots of shrubs and young trees, form the beginning of our almost impenetrable forests, and with the abundant rainfall sufficiently account for the richness of our aa lands.

"The change from the absolutely sterile rock, below porous as a sponge, and with every vestige of life burnt out of it,

to the fertile soil of the surface, is illustrated in the numerous upheavals; the gradual deepening of color as the rocks slowly absorb oxygen from the atmosphere, and humus from the decaying vegetation, is apparent to every observer. Every phase of disintegration is shown, and every class of stone, from the impervious rock, hard as flint and heavy as lead, formed under enormous pressure, to the light and friable scoria which can almost be crushed in our hands, and the transformation from the immense boulder to smaller and smaller rocks until the rock soil—the base of all soils—is formed, takes place almost before our eyes.

"The process of disintegration may be greatly hastened by cultivation. Anything that will stir the rocks and break or chip off small portions from time to time makes it easier for the rootlets to enter the pores, and so hurries along the disintegration and decomposition.

"On such soils as these ordinary methods of culture have to be abandoned; add to this fallen trees lying all over the fields and culture as generally understood becomes impossible; all that we can do is to keep down the weeds and clean around the trees while they are young; in this we have derived great benefit from a suggestion of Dr. Wilcox—the arsenic spray. This is a solution of arsenic and washing soda dissolved in water by boiling, and applied by force pumps in the form of a fine mist; it will not take the place of cultivation, but is a valuable auxiliary.

"We have found that on our aa lands the best and cheapest method is to leave all the debris on the field to rot back into soil; it keeps down the weeds and adds to the humus; it must, of course, be laid in windrows, and gradually pulled together as portions of it disappear; two or three years tell the tale. If the land is planted as soon as cleared of forest—and no other method should be adopted—there will be nearly a year in which no great expense for weeding will be required; but sooner or later the weeds creep in, and then if the trees have not made a good growth in the meantime, the trouble and expense commences. Intercrops may be called

on assistance for the first two years; after that they will have to be abandoned to a great extent, as the roots of the two crops will have interlaced and both will suffer. Our best soils, our arable land! Sand and volcanic ash saturated with humus and thoroughly pervious to air and moisture require less cultivation than more compact soils; even here, however, thorough stirring produces new combinations;

and supplies of food are presented to the innumerable bacteria, and they in turn produce large supplies of soluble food material for the trees—which promptly respond to it—and if fertilizer is liberally supplied in addition at this time two or

more years' growth may be condensed into one. This requires money, and men!—but it is money well and wisely expended.

"Fertilizing is a necessary part of cultivation; it reduces the expense of weeding, not by eradicating the weeds, but by hastening the growth of the crop; two weedings with fertilizer will bring the trees to the same size as three or more without it; it gives them increased vigor, and makes them better fitted to withstand unfavorable conditions later on. We have found that from one-half to one pound, applied around the tree, gives good results, and that two applications are better than one, even if only the same amount of material is used. As to the kind—any good, complete fertilizer will work well, and the higher grades are the cheaper, as the cost of transportation is proportionately less. The best proportions of the phosphates, nitrogen and potash, will have to be matters of experiment; analysis of the soil cannot be entirely relied on; there is in all probability vastly more of each in the soil than you are likely to apply, and it is safe to say that if leaching or washing out can be avoided none of the material will be wasted.

"We have found that a heavy growth of weeds even in the middle of the lines is better avoided; that by cutting everything down there was a great and immediate improvement in the trees. Weeds choke the tiny feeding roots, and by forming a sod prevent the air from entering the soil; this is doubly true of Hilo grass; unless this latter is kept under control the inevitable result with the rubber tree, as with most other trees or plants, is loss of vigor, deterioration, and eventually death."

DISCUSSION.

Mr. Ewart: Do you fertilize all the trees?

Mr. Turner: No; just the younger trees. There is no question whatever about the value of fertilizing.

Mr. Ewart: What kind of fertilizer do you use?

Mr. Turner: Just the ordinary fertilizer of a high grade. The fertilizer that we use was prepared especially for us by the Hackfeld Fertilizer Works. The formula comes from a California fertilizer man, and was given to me as a matter of good will: 10% ammonia from nitrate, 8% to 9% of phosphate from steel bean, 5% muriate of potash. I have never used any straight potash. I used it on one tree and killed the tree. It was a small tree, and I put it on around the roots. I may say that that arsenic spray is an exceedingly valuable suggestion of Dr. Wilcox. It takes two or three applications, but after that it does the work.

Mr. Ewart: What is the formula?

Mr. Turner: One pound arsenic, 4 pounds soda, 1 gallon water. We dilute about 20 times.

Mr. Cooke: What does it cost to spray an acre?

Mr. Turner: The cost of spraying is very little. On ordinary land it amounts to a dollar or \$1.25 an acre, but on our land it would cost more than that, because our land is very rough. I am figuring more on the labor; the cost of material on the acre would not be over a half a dollar. That is very cheap cleaning. A question I think we should ask the Doctor is how long it can be kept up without injuring the soil. We use two or three pounds of soda ordinarily.

Mr. Cooke: Can a man spray an acre in a day?

Mr. Turner: I think he can go over two acres in a day, on ground of the roughest possible description.

Mr. Anderson: Mr. Turner asks how long the spraying can be done without injuring the trees. We have done it for years. We have used this spray for two years.

Mr. Lindsay: How many applications did you make in that two years?

Mr. Anderson: We had one field that we sprayed about once in every three months. We gave it 8 or 10 sprayings, and the trees looked thoroughly healthy, and there is a marked difference in the appearance of the soil. When the grass grows up on the soil, it improves considerably in appearance.

Mr. Turner: It kills out some and does not kill out others.

Mr. Anderson: It is the same thing; I have tried the iron sulphate, but it is not as effective as the arsenic.

PAPER BY MR. C. J. AUSTIN.

Owing to the absence of Mr. C. J. Austin of Nahiku, his paper on "Pests That Have Been Found in Rubber Trees in Hawaii" was read by Mr. Lindsay. It was as follows:

"When the rubber industry was started in this Territory, it was stated by many people that the rubber tree had no pests, so that those that were investing their hard-earned capital in the rubber business need have no fear of later disastrous developments along that line. But, unfortunately, those who made such statements had not taken into consideration the great scheme of universal life which is hemmed in on all sides with enemies of one kind or another.

"And when large numbers of individuals are gathered together these enemies also seem to congregate and carry on a war for existence, and we find that the rubber plant is no exception to the general rule. In the early stages of the rubber planting a small nocturnal marauder, the cut-worm, did considerable damage to the young plants as they were set out, but as the plants grow rapidly and those who had the work in charge learned the habits of this nightly visitor it soon be-

came of little importance, and now it is hardly considered a pest, as it also has a parasite which keeps it in partial check.

"Following the cut-worm, rats commenced their depredations, and with an appetite that one might fear would be dangerous to well-equipped digestive organs, they peeled the bark that contains this most valuable gum we call rubber and in some instances have been known to climb trees that were six or eight feet high and destroy the more tender shoots, either killing the tree or materially setting it back. But their depredations were soon stopped when clean cultivation removed their hiding places, and with the use of dogs and poison their homes were destroyed, so that injuries caused by this small animal are at present not known, for they are so slight it is hardly noticed.

"At the present time there are one or two small pests that are still with us in the form of sucking insects. One of these is a small brown scale that usually infests the under part of the leaves and congregates along the mid-rib and the soft bark of the young and tender twigs. This insect is generally known here as the brown or sheel scale, and has been determined by Mr. Ehrhorn, Superintendent of Entomology of the Board of Agriculture and Forestry, and others, as being *Saissetia nigra*. The injuries that are caused by this do not come so much from what they take out of the tree, as by a black fungus that grows on the honey-dew exuded by this scale. This fungus covers the leaves and branches of the tree and materially checks the respiratory organs, and to a certain extent weakens the tree. The other of these sucking insects is what is generally called the Miali Bug (*Dactylopius*). This also exudes a honey-dew which supplies the growing fungus with the material and also has a tendency to curl up the leaves, which are all injurious to the tree, to some extent.

"However, through the assistance of the Board of Agriculture and Forestry, parasites for these insects have been introduced in the Nahiku district, and we trust that these insects will soon be a thing of the past, or be under such control that their injurious effects will not be felt, as the scale has already shown signs of diminishing.

"Since tapping has commenced, a few slight injuries by boring beetles have been noticed, but at present we are unable to give any special information, nor do we know that it can be classed as one of the rubber pests; but will require close observation during the coming year to see that it does not get a start in our fields.

"There is still another pest that may possibly become a menace to our Heveas. This is a fungus disease which is closely allied to what is known as shot-hole fungus (*Physlosticta prunicola*), but no fear need be felt from this fungus, as we know how to deal with it."

At the afternoon session of the convention the following officers were elected to serve for the ensuing year:

C. D. Lufkin, President.

William Williamson, Vice-President.

D. C. Lindsay, Secretary and Treasurer.

Bertram von Damm, Director.

Wade Warren Thayer, Director.

PAPER BY MR. WILLIAMSON.

"The Present Status of Rubber Growing in Hawaii" was then discussed by Mr. William Williamson as follows:

"Gentlemen of the Convention:—A couple of weeks ago Mr. Waldron came to me and asked me if I would talk, and I told him that I would be very glad to. He wanted me to talk about marketing, or something else. I told him I would talk about marketing, but mostly about something else. All I can say about marketing is that we accumulated about 40 pounds of rubber, of which 18 pounds was scrap. We did not feel like giving this away, so we sent it on through Alexander & Baldwin, through their New York agents, as it was sufficient to make up what the companies back there seemed to want—that is, a good working sample. We expect within a week or two to get a report from that rubber. In order to get something to talk about, and as I had not been in Nahiku for two years, but previous to that had been over there three or four times each year, and had seen the various companies plant their lands, I thought it would be a good idea to go to Nahiku and try to give you here a general idea of the condition of things over there on Maui.

"When the first rubber companies were organized to plant rubber trees at Nahiku, some six years ago, it was thought that all that would be necessary would be to cut down the virgin forest, dig holes 3 or 4 feet in diameter, and plant the seedlings there. During the first year the trees grew remarkably well, but as the roots struck the edge of the hole, instead of striking through into the virgin sod, in many cases they turned back and formed a tangle within the original hole. The natural result was that during the second and third years they failed to respond to hoeing and became backward in their growth.

"During 1908 a few acres to be planted to Hevea from choice seeds were plowed in preparation and the trees planted in this area showed such thriftiness that at the beginning of the next year three of the companies operating in the district decided to clear the Ceara fields of all stumps and grass and stir the soil of all the space between the trees. Of the 800 acres planted by these three companies, 550 are now clean cultivated, and the balance will be within a few months. The

trees have responded readily, showing an average growth of 4 inches in circumference per year, from which it is evident that had the first plantings been in plowed ground, the Nahiku product would have made its appearance in the market last year when rubber reached \$3.00 per pound. These lands, once cleaned up, are kept in condition by an occasional spraying with arsenite of soda. The writer was doubtful of the wisdom of applying a powerful poison over any considerable area when it was first recommended, but insofar as he can see it kills the grass and weed growth but has had no injurious effect whatsoever upon the trees. Some of the lands so treated for about a year where the branches interlace to shade the ground are now so free from grass and weeds that they will require no more attention. Acreage that has not been cleaned up is backward, and it is evident that the longer the trees are neglected the longer will be the wait for returns, while many thousands of trees will never reach tapable size, while they must share the life-sustaining properties of the soil with the grasses and weeds that grow between.

"Throughout the fields are a few thousand trees that have attained a circumference of 20 inches, and a few hundred will measure as much as 30 inches. The average run of the 1905-1906 plantings is 12 to 18 inches.

"Eight men who have become fairly adept at handling the tapping knife are now tapping under the direct supervision of the several managers. These will form the nucleus of a much larger force that will be required next year, when at least 20,000 trees will have attained tapable size.

"From the results obtained by these men, explained in detail by another paper to be read here today, the rubber industry, young as it is, offers great promise of a reasonable return on capital invested, if conducted as it now is by men of intelligence, ingenuity and adaptability.

"As the time for tapping over a large area is at hand, one plantation has already ordered machinery for a factory, which will be running within a few months.

"A movement is now on foot to unite the companies now operating at Nahiku, and if successful this factory will be enlarged to handle the product of the whole district. Additional advantages to be gained by this move are the establishment of a standard product to be known as Hawaiian Rubber and doing away with competition for labor among the various companies.

"Noticeable in the district is the planting that has been done by homesteaders. With a factory at hand to handle the product as it comes from the trees, the writer sees for the individual planter a profitable use for his land."

be done. The weeds could not be annihilated because it is so wet that they, after being hoed, would again grow up. No plant can grow without air any more than an animal can, and if you shut out the oxygen it would die in a short time and it will show the effects of the lack of oxygen very quickly.

One of the most striking things to me on looking over all the plantings and comparing them with about a year before, was the great changes that had taken place in the physical appearance of the soil where this weed eradication had been carried on. In some places the soil was mud and the horse went along in the mire. After the weeds were removed, the superficial water ran off and many of those places were actually more or less dry. There was a very noticeable difference and the air was going into the soil and the trees were growing.

Now, from the results that have been had so far in growing rubber in Nahiku, it seems to me that we may be sure that a tree large enough for tapping can be got inside of five years. I do not think that unreasonable. Inside of three years we could get them, with the best cultivation, but five years is plenty of time to allow to get a plantation of good size for convenient tapping. It is not possible by any means to get clear without cultivation. You can go about the plantations and see trees three years old with cultivation that are larger than trees five years old without cultivation, in similar conditions. That saving of two years is, of course, of immense advantage. It might make all the difference between succeeding and not succeeding, keeping the stockholders encouraged and having them discouraged, and having the question of financial backing trembling in the balance all the time.

Of course, I have heard some expressions of slight disappointment from time to time at the results of tapping experiments which have been carried on here. I think we have been unduly enthusiastic about the yields which we are going to get, and particularly in Hawaii we are always looking for too large profits. But the results indicate, as Mr. Anderson said this morning, very clearly that a reasonable profit can be obtained from the rubber trees as they stand, and this is the time to settle the matter, so far as we can tell now, as to whether the rubber is an industry here or not. If you can take trees that were planted five years ago with no special knowledge as to what ought to be done to rubber here, starting in on an industry of which there was absolutely nothing known to us and, after making some mistakes, still get trees which will yield a profit in five years, it seems that would settle the point as to whether there is a reasonable profit in caring for rubber trees, for every man who has charge of

rubber work on every plantation is now armed with a whole arsenal of information.

The yields, as I look at it, are very encouraging. We are dealing with young trees that are more or less lacking in uniformity because they did not receive the same line of treatment. We have had different methods of tapping and while there may be a hesitation on the part of some as to the foundation of getting enormous profits, there must be big profit in the business when we can take it out at 50 cents a pound and sell for \$1.40, with the unskilled labor here.

One thing that appears interesting to me in the experiments of the Nahiku Rubber Co. under Mr. Anderson is the fact that boys do the work very well. It is not a heavy class of work; it does not require much brute force. It merely requires a little manual skill and dexterity. They are very quick in collecting the rubber. It is all light work, and they can easily carry a bucket, perhaps faster than a grown person, and do the work just as well. That indicates that in that cheap labor we can find a solution of the problem of reducing the expense, provided the price of rubber should fall below where the rubber growers might wish it to fall.

In the matter of diseases and the insects and pests of rubber, I do not believe they are very serious so far. It may be that some will develop of which we know nothing now and there are but few instances of trees which have been seriously affected by the shot-hole fungus or even with rats, as soon as the ground in between the trees has been cleared up.

Another point is the matter of altitude. I don't know whether it would be wise, it never is commercially, to try to find the limit of altitude in which rubber can be grown, but in going over the plantations last May I was enabled to note that the rubber grew as well 1400 feet as it did at some lower elevations where it received the attention that it deserved. However, an altitude up to 1300 or 1400 feet does not seem to affect the rapidity of the growth.

The question of the kind of rubber to be grown here is somewhat left open yet, but the decidedly more rapid growth of *ceara* seems to indicate that that is the one upon which we can depend at present. There is also the *hevea* and the *castilloa*, which have been discussed. There have been at times a number who have been enthusiastic about the growth of *hevea*, but it is so slow as compared with *ceara* and is affected so much more by the winds and altitude, for it seems to dwindle out at 1000 or 1100 feet, that it seems that the *ceara* tree is the one to grow here. And as to the rapidity of growth, we may say that the *ceara* does remarkably well here and is perfectly satisfactory as to the rate of growth, and in the most part in the shape of the trees.

Referring again to the tapping experiments which Mr. Anderson has been carrying on, I would suggest that a device might be gotten up which would hold several knives at the same time. That might be possible if we had several trees the same size in trunk; one knife might not cut as deep as the other knife, and in straight cuts a device something like the instrument that was submitted to Mr. Hosmer from a Mexican rubber expert might be modified, in such a manner as to carry several knives, but the device itself would have to be worked out right on the plantation. As a matter of fact, all of the actual, practical details of how to make rubber economically have to be worked out by the man who has charge of the plantation. We cannot depend upon any man who has other things to bother about and is looking at it from a different standpoint from the man who is interested in it. He can not work at the practical details. I am always glad to do whatever I can do toward the encouragement of any industry which really promises to give rewards which warrant one in being encouraged, and I have been impressed with the management of industries which are more or less new and on which we have only limited local experience.

One of the things in gaining success is not to be too enthusiastic at first, not to expect three or four hundred per cent., not to expect that the crops are going to grow without attention, and not to expect that there is going to be no trouble. The plants require attention. It requires not only money, but brains and industry joined together and applied to the business at all times in order to make a success of it, and I honestly believe that the results which we have gotten so far from rubber show that not only have there been men with the courage to put their money into it, but that the work which has been done by the men who have had practically to manage this business, has been conscientious and has brought about results which are all that any reasonable man can expect, and so, gentlemen, it seems to me that these results are very encouraging at the present time. If you can get profit from the trees you have now I do not see that there should be any worry about the methods. In looking after the little details which may improve the business from your standpoint, the proposition to unite the companies together I believe would be a very fine scheme, indeed. It would accomplish just what Mr. Williamson said it would. It would be more economical. You need to have a large plant in order to manage the thing economically. If you are going to have a thing on the market as Hawaiian rubber, it should be of the same quality, so that the market can be kept up, so it seems to me that the rubber situation would be greatly improved if the companies were united in an equitable basis.

DISCUSSION.

Mr. Anderson: At the last Convention we asked Dr. Wilcox about the spray. As we have only used this material for about a year, he might be able to tell us what he thinks about it.

Dr. Wilcox: As I said this morning, I have used several formulas at the Station, I believe you found that 1 to 20-24 is about right; about a hundred gallons covers an acre. At that rate, only 5 pounds of arsenic were used per acre. It is in a very soluble form. The most of it is held upon the plant and finally falls down when the plant falls down or if you burn it up, it is burned up in that way. Five pounds per acre is actually less than has been applied for 20, 30 and 40 years on the same ground in orchards on the mainland, without causing any injurious effects on the soil. The presence of arsenic, even in a soluble form, would not cause a burning effect on the roots, because they are too thickly covered with bark and the mere presence of it at that rate does not cause any harmful effect on plants. I don't see any reason why we should worry about that. If it is to be kept up for years and years and years, you might think there might be an accumulation. The soluble salts are continually washed out of the soil, and I do not believe it could accumulate beyond a certain limit. I doubt whether it will ever accumulate.

Mr. Turner: I may say that in spraying our trees, the barrel was placed between two trees and in dipping out from the tin there was a certain amount of dripping and the exact amount that was wasted I do not know, but it was merely dripping. The bark burst open and bled all the way through and the tree was defoliated.

Dr. Wilcox: How much was poured in there?

Mr. Turner: I was not along with them at the time. The trees are not dead, but they have not recovered yet.

Mr. Cooke: I would like to offer a suggestion to the Convention at this time. It seems to me that we are about getting to a position where the rubber will be placed on the market. It might be a good idea to have a committee look into the marketing conditions and make suggestions at the next Convention. It seems to me that if a certain standard of rubber can be produced, possibly a unique form of putting it upon the market might give the Hawaiian planter a certain advantage. I don't believe there is much call for a report, but just offer this as a suggestion.

Chairman Lufkin: It seems to me eminently in order that such a committee should be appointed.

Mr. Cooke: I make it as a suggestion, and as a motion also. Dr. Wilcox said that in all shipments we should maintain a

certain standard, and that in my experience is most essential, and it is very essential that the bulk of the product should come up to the standard.

Chairman Lufkin: The motion is duly seconded that a committee of three be appointed to investigate the rubber market, looking forward to future marketing of the rubber crop on the several plantations. Of course, in the present condition of the rubber business, we are all acting for this individually, and it would hardly be practicable, but in view of the fact that combinations are likely to be made, I think we are good business men enough to see the advantage of it, where the marketing can be done by one concern or agency.

Mr. Turner: There are no two plantations that bring the same rubber; they do not bring the same price.

Chairman Lufkin: The object is to investigate the market, ascertaining the best form in which to place the rubber on the market, pancakes or whatever it is, and at the next meeting of this Convention to make a report which will put us in the right way of marketing the rubber at that time. I understand this committee is to make merely preliminary investigations. Motion carried.

Mr. von Damm: I would like to say that sometime ago I got a small sample of Nahiku rubber from Mr. Williamson and sent it to London, where a friend of mine in turn took it to experts, and he wrote me and said that they had not seen rubber in that shape before, but that these experts, after analyzing the sample, had said that it would fall not very far short from the top price of Para, and they were very anxious to find out whether it came from the hevea or ceara trees. I had written him that we were principally growing ceara on these Islands. The experts had had the impression that it might have come from the hevea tree.

Mr. Anderson: We were told by manufacturers in New York that most of the ceara rubber they get is not properly washed and dried, that they had imported ceara rubber from abroad and had been unable to use or dispose of it and had sent it back. They said that all they needed was working samples in order to give us a definite price for our rubber.

MR. R. S. HOSMER'S REMARKS.

Chairman Lufkin: My predecessor has very wisely obtained the consent of Mr. Hosmer to address the Association.

Mr. Hosmer: I did not come here to make any speech; I am only an individual member to show my interest in the Association, and indeed I have not anything technically to contribute. Unfortunately, the appropriations of our Board have not been sufficient for us to branch out

except for our regular routine work, so I have not gone into this investigation from a technical standpoint.

There are two things I would like to say, however. The Board of Agriculture and Forestry is always willing to do all it can in helping on any of the so-called "allied industries," and rubber naturally appeals very strongly to us as an industry in which we are especially interested. At this time we can help, possibly, by opening the columns of our monthly magazine, the Hawaiian Forester and Agriculturist, if you desire to publish the reports of this meeting. Even if you publish them again as a separate, the report could well appear as a special number of the Forester. I think that the papers which have been read here today ought to be made of permanent record and given wide distribution. They ought to go on record for future reference.

One other matter, and that is the suggestion made by Mr. Anderson at the end of his talk, that someone from this Association should be present at the Rubber Growers' Meeting in London, next spring. I don't know much about that meeting, but I do know that there is going to be a big meeting there, and I know from my own personal experience that it is a mighty good thing for the man himself, for anyone occasionally to go to such meetings. He gets a great deal out of it, and the information brought back is of value to the industry. I strongly recommend that one of the technical rubber men be sent on behalf of the Association, or in some other way, to represent the Association there; to be on hand to bring back as much information as he can.

If at any time or in any way the Board of Agriculture and Forestry can be of assistance to the members of this Association, we are there to be called upon.

REMARKS BY MR. E. M. EHRHORN.

Mr. Ehrhorn, Territorial Entomologist: I don't know that I can tell you very much about the pests that affect the rubber. I have just read Mr. Austin's paper and there is just one thing I can say and that is that the rubber growers can be congratulated because they have very few pests attacking the trees. Since last year I have looked into the matter, and in fact have kept in very close touch with the rubber growers, and I can say that we know of only two scale insects, that those are insects that are found in forests, generally speaking, but they are kept in check by the parasites that are already here. I forwarded to Mr. Austin at Nahiku some of these parasites because he was complaining about the black scale pest. The mealy bug, which attacks the rubber tree, is one common kind, but I do not think that you are in danger

from that pest or that it will injure the rubber tree. The cut worms have, of course, attacked the rubber tree, but that when they were only very small and the trees were protected by the grass. I think that hereafter there will be very little trouble with the cut worm.

There is one thing that we should all be prepared for and that is the importation of any rubber varieties. We have here all the kinds that we want now and the only danger in the importation of more is the bringing in of new pests through importing trees. There is very little danger from the seeds, yet someone might find some new species of pests, and there is where the danger is, because in Ceylon there are several root diseases which are very serious pests. They have also the white ant which attacks the green timber of the rubber tree, and it is known that in Ceylon this species attacks the timber of the rubber tree. In shipments of plants from Manila we find all kinds of pests and of course we are always very careful to see that they are killed before being landed. There is one pest that Mr. Austin speaks of in his letter, and he sent me specimens of it. They are two small beetles which he found in the root of the rubber tree. They are a common native species, and I told him that as far as my conclusions at that time were concerned, the beetles had appeared on account of some sap remaining on the tree after the tree was cut, and that always draws beetles. I do not think that that pest really would be considered as a pest of the rubber tree. Evidently it was not very alarming because I have not heard anything more about it.

The rubber growers are very fortunate in having so few pests, and I think it will be possible to keep out any others.

President Lufkin appointed Messrs. F. L. Waldron and George P. Cooke to take up the matter of sending a representative of the Association to attend the London Rubber Exhibition in June.

Messrs. Wade Warren Thayer, Albert Waterhouse, and A.

Castle were appointed as members of the Publicity Com-

Messrs. George P. Cooke, F. L. Waldron, and William Williamson were named as the Committee on Markets and Marketing.

After tendering votes of thanks to Dr. Wilcox, Mr. Hosmer, and Mr. Fehr for their able addresses, the Convention adjourned.

BOARD OF AGRICULTURE AND FORESTRY.

Minutes of the meeting of the Board of Commissioners of Agriculture and Forestry, held in the Throne Room, at the Capitol, on Monday, December 28, 1910, at 2 o'clock p. m.

Present: Marston Campbell, President and Executive Officer; Messrs. D. P. R. Isenberg, H. M. von Holt, and Albert Waterhouse, members; Edward M. Ehrhorn, Superintendent of Entomology; Ralph S. Hosmer, Superintendent of Forestry, and Victor A. Norgaard, Territorial Veterinarian.

The minutes of the meeting of November 21, 1910, were read, ordered approved and placed on file.

FORESTRY.

Mr. von Holt stated that the Committee on Forestry endorsed the recommendations of the Superintendent of Forestry contained in his report upon the creation of a forest reserve in the District of South Kona, Island of Hawaii, and modifications of the boundaries, of existing forest reserves in the District of Kau, Hawaii, and Wailuku, Maui.

It was voted that the Superintendent of Forestry proceed along the usual course in the matter of the above-mentioned reserves.

Mr. Hosmer read a letter from Mr. Alan S. Davis, dated November 28, of Wahiawa, making application for the right to cut dead wood in the forest above Wahiawa. Mr. Hosmer called attention to the fact that this was the same area in regard to which the Board some time ago had made arrangements, with Mr. Hopper and Mr. Templeton, for the removal of wood, which owing to various reasons had not worked out satisfactorily. The conditions on the ground have in no way changed since the Board had refused further to extend the time of Mr. Hopper's license.

After some discussion it was voted that the application of Mr. Davis be denied and that the Superintendent of Forestry so inform him.

Mr. Hosmer said that Mr. Haughs had recently received a letter from Mr. Gerrit P. Wilder, giving details in regard to seed which he had collected and forwarded for the use of the Board, from which he quoted extracts. Thereupon it was voted that the Board of Commissioners of Agriculture and Forestry extend to Mr. Gerrit P. Wilder its thanks and express its appreciation of his services, rendered in sending seeds and plants to Hawaii from the different countries he has visited.

THE PASSION VINE.

Mr. Hosmer submitted a report from Mr. J. F. Rock, Botanical Assistant, covering the work for the last ten months, and called special attention to certain paragraphs having to do with the spread of certain pests in some localities, more particularly on East Maui and in lower Manoa Valley, Oahu. As a result of this mention the Superintendent of Forestry was instructed to communicate with the proper authorities at Oahu College, calling their attention to the danger existing from the spread of this plant, and suggesting that they have it removed. It was further voted that a circular letter in regard to this plant be sent out to stock raisers and other land owners in districts where the passion vine is most likely to be introduced.

LETTER TO DR. URBAN.

The Botanical Assistant of the Board asked that Dr. Ignatz Urban be requested to loan certain genera of Hawaiian plants which were once in the possession of Dr. Hillebrand, for the purpose of comparing his type material with the large collection in the herbarium of the Board of Agriculture and Forestry, whereupon it was voted that the Executive Officer be directed to prepare a letter to Dr. Ignatz Urban requesting such a loan and that the Executive Officer then submit his letter to the Governor for endorsement.

REGULATION OF SEED.

Following the vote of thanks to Mr. Gerrit P. Wilder, the members of the Board entered into some discussion regarding the importation and distribution of seeds, especially in relation to the control of weed seed and the seeds of plants likely to become pests, and it was voted that the Superintendents of Forestry and Entomology be instructed to act as a Committee to formulate recommendations as to pure seed legislation for Hawaii, either through action by the Legislature or through rules and regulations of this Board.

BANANA PLANTS.

Mr. Anderson submitted a special report on the importation of banana plants from Central America and other areas about the Gulf of Mexico, it having come to his notice that there existed a liability of importing a very large shipment of plants from these sections.

His report went into the matter very fully, setting forth the danger which existed in Central American areas and he

recommended that the Board take action to prevent the importation of banana plants of the Bluefield variety.

As we have already this banana here in the Islands, Mr. Ehrhorn showed, by a copy of the minutes of 1903, what action was taken at that time when some 500 plants had been imported. The Board then instructed Mr. Ehrhorn to draw up the requisite rule and regulation which he deemed necessary for the protection of the banana industry and that he submit the same to the Board at its next meeting.

THIMBLE BERRY.

Mr. Ehrhorn reported that since Mr. Alfred Carter's return he had had an interview with him in regard to the thimble berry, which has cost such a great amount of money in the effort of eradicating on the Parker Ranch, and that Mr. Carter had expressed his gratitude to the Department for its efforts to find some means for the eradication of the pest. Mr. Ehrhorn stated that he was continuing his investigations along the same line as mentioned in a previous report and that he had great hopes soon to be able to introduce the disease into areas that are still in a healthy condition.

IMPORTATION OF BENEFICIAL BIRDS.

The Superintendent of Entomology being a committee appointed at the last meeting to look into the matter of importing insectivorous birds, submitted a letter from Prof. Henshaw, Chief of the Biological Survey, giving his opinion in regard to the possibility of introducing certain birds into the Hawaiian Islands. This lengthy report created quite an interest, and an enthusiastic discussion followed, whereupon Mr. Isenberg personally thanked Mr. Ehrhorn for the able report which he had succeeded in obtaining regarding the importation of birds.

CROWDING AT STEAMER GANGWAYS.

The Superintendent of Entomology then drew attention to the overcrowding at the gangways on the arrival of steamers and asked if not some steps could be taken by the Board to prevent this, as it was next to impossible to thoroughly inspect each passenger's baggage as he stepped off the gangway. The members agreed that they had experienced the same inconveniences in trying to get off and on the vessels, and they heartily endorsed Mr. Ehrhorn's plea, and agreed that the exclusion idea is a correct one.

Mr. Campbell said he was very glad the matter had been brought up, as he had been placed in rather a peculiar posi-

tion regarding the keeping out of the public, and that action would be taken to protect the gangways and prevent the crowding by the masses at the arrival of steamers. He further stated that in all probability gates will be erected which will form corrals with sufficient space to allow the easy handling of passengers and baggage.

FINANCES.

The Secretary submitted the regular monthly report of the finances of the Board, which was approved.

ANIMAL INDUSTRY.

The Committee on Animal Industry had nothing to report.

LIVESTOCK INSPECTOR'S RESIGNATION.

Since the sick leave of absence with pay for one month to John Vanhuizen, granted at the meeting of the Board held November 21, he tendered his resignation, which was accepted as of November 30, 1910.

There being no further business to be brought to the attention of the members of the Board, the meeting adjourned.

Minutes of the meeting of the Board of Commissioners of Agriculture and Forestry, held in the Throne Room, at the Capitol, on Tuesday, January 10, 1911, at 2 o'clock p. m.

Present: Marston Campbell, President and Executive Officer; Messrs. H. M. von Holt and Albert Waterhouse, members.

This meeting was held for the special purpose of considering the finances of the Board. A detailed statement of all salaries and payrolls was submitted; also an estimate for the expenditure of the allotment from January 1 to April 30, 1911, and an estimate of the appropriations needed for the extension of service, for the new period, beginning July 1, 1911, to June 30, 1913.

All action was deferred until next meeting of the Board.

There being no further business, the meeting adjourned.

DIVISION OF ENTOMOLOGY.

Honolulu, December 31, 1910.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu.

Gentlemen:—I respectfully submit as follows my report of the work of the Division of Entomology for the month of December.

Of 32 vessels boarded we found fruits, plants and vegetables on 19, careful inspection being made on all shipments with the following result:

<i>Disposal with principal causes.</i>	<i>Lots</i>	<i>Parcels</i>
Passed as free from pests	882	20,165
Fumigated before releasing	10	309
Burned	54	54
<i>Total Inspected</i>	<i>946</i>	<i>20,528</i>

The Inspector at Hilo reports having boarded six vessels, of which five carried vegetable matter, consisting of 182 lots and 3743 packages, which were passed as free from pests.

The bulk of the shipments during this month consisted of fruits and vegetables intended for the Xmas trade, and here as well as at Hilo it was noticeable that especially choice goods were shipped to the Islands. The fruit was of large size and good quality, and the vegetables clean, well packed and selected. Brother Newell records the largest shipment for any month in the history of Hilo, and adds: "Thanks to the good education the shippers are acquiring, only clean goods were forwarded."

The Japanese rice shipments this month amounted to 18,109 bags and after thorough inspection we failed to find any weevils or pests in these shipments.

On a shipment of plants from Japan we found the *White peach scale Aulacaspis pentagona*, the *Camellia scale Pseudonidia duplex*, and the *Small Wax scale Ceroplastes rusci*, and on a few Camellias we found a few *Bag Worms Thyriodopteryx sp.* After thorough fumigation each plant was gone over and all infested foliage removed and all bag worms, although dead, were picked off. From the Orient we confiscated and burned 54 packages of fruit found in the baggage of the immigrants at the Immigration Station.

During the month your Superintendent made a special report on the proposed shipment of Bluefield banana sprouts from Central America as mentioned in my last report, and is gratified at the action the Board has taken in not allowing any shipments to enter the Territory.

It is with regret that I have to report the illness of my assistant, Mr. H. O. Marsh, at this time. Mr. Marsh has continued his field and laboratory work on the same lines as heretofore, and since his illness I have continued his observations and study of the life history of two of the most destructive vegetable pests on the Islands, *Himenia fascialis* and *Helicula undalis*. The importance of knowing how many broods these pests produce during the year, requires the continuation of the work and has added considerable exertion to my duties.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

BY AUTHORITY.

 RULE VIII.

 RULE AND REGULATION BY THE BOARD OF COMMISSIONERS
 OF AGRICULTURE AND FORESTRY CONCERNING THE IM-
 PORTATION OF ALL BANANA FRUIT, BANANA SHOOTS OR
 PLANTS.

Whereas, This Board has, by notification of the United States Department of Agriculture and by its own investigation, been apprised of the existence of a serious and infectious plant disease on banana in many parts of the world, which disease is rapidly spreading throughout the infested localities, necessitating the abandonment of thousands of acres of banana plantations therein, and is extending to other localities, and inasmuch as the existence of this disease in imported plants and fruit can not be ascertained by local inspection nor eradicated by fumigation, and no good method of control of the disease has yet been found,

Therefore, The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby make the following rule and regulation:

Section 1. For the purpose of preventing the introduction into the Territory of Hawaii of a banana disease known also as banana blight, and determined as *Fusarium cubense*, all persons, companies and corporations are hereby prohibited from introducing or importing into the Territory of Hawaii, or into any of its ports for the purpose of debarkation into said Territory any fresh banana fruit, banana sprouts or plants, from Central America, including the Panama Canal Zone, the West Indies, Dutch Guiana or any other locality where the said disease exists or may become known to exist.

Section 2. This regulation shall take effect from and after the approval thereof by the Governor.

MARSTON CAMPBELL,

President and Executive Officer Board of Commissioners of Agriculture and Forestry.

Approved:

W. F. FREAR,
Governor of Hawaii.

Honolulu, Territory of Hawaii, January 25, 1911.

 PROCLAMATION OF MODIFICATION OF BOUNDARY OF THE
 WEST MAUI FOREST RESERVE. DISTRICT OF WAILUKU,
 ISLAND AND COUNTY OF MAUI.

Under and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I, WALTER F. FREAR, Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said acts provided, do hereby modify the boundary and increase the area of the West Maui Forest Reserve in the District of Wailuku, Island and County of Maui, created and set apart by proclamation of the Governor of Hawaii, on April 21, 1908, and do now and hereby set apart as an integral part of the West Maui Forest Reserve that certain piece of government

land sometimes known as Polipoli, Waiehu Remnant, and containing an area of 42 acres, in the District of Wailuku, Island and County of Maui, Territory of Hawaii, more particularly described by and on a map made in September, 1910, by the Government Survey Department of the Territory of Hawaii, which said map is now on file in the said Survey Department, marked "Registered Map No. 1436" and "upper portion of Polipoli," and a description accompanying the same, numbered C. S. F. No. 2214, which said description, now on file in the said Survey Department, is as follows:

Beginning at an iron rail on the boundary of the ili of Ahikuli and on the upper side of Waihee Ditch, the coordinates of which referred to Government Survey Trig. Station "Waiehu" are 2711.3 feet South and 7051.1 feet West, as shown on Government Survey Registered Map No. 1436, and running by true azimuths:

1. 195° 20' 20.4 feet along the upper side of the Waihee Ditch along Grant 5279 to C. Brewer & Co., Ltd.;
 2. Thence along same and said grant on a curve to the left having a radius of 250.8 feet, the azimuth and distance of the chord being: 168° 19' 189.7 feet;
 3. 146° 40' 127.0 feet along same and said grant;
 4. Thence along same and said grant on a curve to the left having a radius of 76.9 feet, the azimuth and distance of the chord being: 120° 10' 68.6 feet;
 5. 93° 50' 303.0 feet along same and said grant;
 6. Thence along same and said grant on a curve to the right having a radius of 81.9 feet, the azimuth and distance of the chord being: 115° 50' 59.0 feet;
 7. 38° 35' 106.0 feet along said grant to the edge of the Waiehu Ditch;
 8. 98° 12' 197.0 feet along the edge of the Waiehu Ditch along said grant;
 9. Thence along same and said grant on a curve to the right having a radius of 50 feet, the azimuth and distance of the chord being: 169° 48' 85.0 feet;
 10. 241° 06' 153.8 feet along same and said grant;
 11. 243° 33' 105.0 feet along same and said grant;
 12. 166° 28' 220.0 feet along said grant;
 13. 97° 59' 213.0 feet along the edge of the Waiehu Ditch and said grant;
 14. 132° 15' 56.4 feet along same and said grant;
 15. 164° 18' 40.0 feet along same and said grant;
 16. 192° 46' 61.0 feet along same and said grant;
 17. 231° 15' 29.0 feet along same and said grant;
 18. 254° 10' 210.0 feet along same and said grant to the mauka or upper side of the Waihee Ditch;
 19. 206° 10' 90.4 feet along the upper side of the Waihee Ditch and said grant;
 20. Thence along the same and said grant on a curve to the left having a radius of 125.7 feet the azimuth and distance of the chord being: 172° 50' 140.4 feet;
 21. 139° 10' 30.0 feet along same and said grant;
 22. 67° 59' 2973.2 feet along the ili of Hananui to the end of the land of Polipoli;
 23. 272° 08' 3393.0 feet along the ili of Ahikuli to the point of beginning;
- Area, 42 acres.

In Witness Whereof, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.

Done at The Capitol in Honolulu, this 4th day of February, A. D. 1911.

W. F. FEAR,
Governor of Hawaii.

**PROCLAMATION OF MODIFICATION OF BOUNDARY OF THE
KAU FOREST RESERVE, DISTRICT OF KAU, ISLAND AND
COUNTY OF HAWAII.**

Under and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I WALTER F. FREAR, Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said acts provided, do hereby modify the boundary and area of the Kau Forest Reserve in the District of Kau, Island and County of Hawaii, created and set apart by proclamation of the Governor of Hawaii, on August 2, 1906, by certain changes in the location of the boundary, which changes somewhat increase the area of the reserve, and do now and hereby recommend and approve as an addition to the Kau Forest Reserve those certain pieces of Government and privately owned land adjoining the said Kau Forest Reserve on its southeastern boundary, and containing an area of approximately 216 acres, in the District of Kau, Island and County of Hawaii, Territory of Hawaii, more particularly described by and on a map made September, 1910, by the Government Survey Department of the Territory of Hawaii, which said map is now on file in the said Survey Department, marked "Registered Map No. 1837" and "Additions to Kau Forest Reserve," and a description accompanying the same, numbered C. S. F. No. 2213, which said description, now on file in the said Survey Department is as follows:

ADDITIONS TO KAU FOREST RESERVE.

PART I.

Including portions of the lands of Kaalaala-Makakupu (Government), Keaiwa (Hawn. Agr. Co.), and Kaauhuhuula (Government).

Beginning at the "Kakaha" Government Survey Trig. Station, as shown on Government Survey Registered Map Nos. 1837 and 2361, and running by true azimuths:

1. 352° 30' 1400 feet to point 10 feet makai of flume;
2. 12° 15' 274 feet to point 10 feet makai of flume;
3. 15° 25' 1600 feet to point 10 feet makai of flume;
4. 341° 25' 530 feet to point 10 feet makai of flume;
5. 346° 50' 222 feet to point 10 feet makai of flume;
6. 16° 40' 1300 feet to point 10 feet makai of flume;
7. 60° 20' 760 feet to point 10 feet makai of flume;
8. 12° 30' 1200 feet to point 10 feet makai of flume;
9. 25° 10' 1700 feet to point 10 feet makai of flume;
10. 18° 53' 1480 feet to point 10 feet makai of flume;
11. 10° 00' 1060 feet to point 10 feet makai of flume;
12. 0° 1258 feet to point on present Forest Reserve line 200° 41' feet from a Forest Reserve Monument just mauka of flume;
13. 2,125 feet along course 36 of the Kau Forest Reserve as described and set apart in a proclamation signed by George R. Carter, Governor, dated August 2, 1906, to the original point.

and the area of the additions is as follows:

Kaalaala-Makakupu Tract (Government)....	32 acres.
Keaiwa (Hawaiian Agricultural Co.).....	23 acres.
Kaauhuhuula Tract (Government).....	60 acres.

W. F. Frear.

PART II.

Including portion of the Government land of Palima.

Beginning at a point on the present forest line in Paauaua I, by true azimuth $200^{\circ} 40' 31$ feet, from a forest reserve monument, which in turn is true azimuth $189^{\circ} 25' 5027.5$ feet from the "Alili" Government Survey Trig. Station, as shown on Government Survey Registered Maps Nos. 1837 and 2361, and running by true azimuths::

1. $353^{\circ} 30' 60$ feet to point 10 feet makai of flume;
2. $49^{\circ} 45' 1030$ feet to point 10 feet makai of flume;
3. $85^{\circ} 35' 240$ feet to present forest line;
4. $234^{\circ} 40' 1235$ feet along course 37 of the Kau Forest Reserve as described and set apart in a proclamation signed by George R. Carter, Governor of Hawaii, dated August 2, 1906, to the aforesaid forest reserve monument;
5. $200^{\circ} 40' 31$ feet along course 36 of the said Kau Forest Reserve to the initial point.

Containing an area of 2.2 acres.

Altogether an area of 216.2 acres.

And as provided by law, I do hereby Set Apart as integral parts of the Kau Forest Reserve those portions of the Government tracts known as Kaalaala-Makakupu Tract (82 acres), Kaaunuhuula Tract (109 acres) and Palima (2.2 acres), altogether an area of 193 acres, more or less, that lie within the metes and bounds of the above described addition and newly created part of the Kau Forest Reserve.

In Witness Whereof, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.

Done at The Capitol in Honolulu, this 4th day of February, A. D. 1911.

W. F. FREAR,
Governor of Hawaii.

LETTER FROM MR. GERRIT P. WILDER.

During an extended trip that has included many foreign countries, Mr. Wilder has been continually sending back consignments of seed of many interesting plants. This letters tell of the results of his visit to the West Indies.

Port of Spain, Island of Trinidad,
November 23, 1910.

My Dear Mr. Haughs:—I have been in the Island of Trinidad just two weeks and during that time have visited a coco plantation, have been to Cedros Bay where Columbus is said to have anchored and gone ashore for fresh water, by railroad I have visited two fine coconut plantations and during my visits to these several places have had a chance to see and have collected a host of information and of seeds and plants. Many of these are entirely new to our Hawaiian flora.

The palms here are very interesting. Besides these there are new and useful forest trees. Many of the above mentioned are now in fruit and it is a very unfortunate thing for us, for I have wondered how I could get some of these seeds to Honolulu. other than by way of New York, where of course the seeds would lose their germinating properties on account of the intense cold.

I met a friend who has gone to Panama, and he has carried and undertaken to send to you by parcels post, if possible, some of the heavier packages, so I am hoping that my efforts may reach some degree of success.

I am enclosing a complete list of the palm seeds and the other things. If you find that these packages of seeds are going to occupy too much space at the station, or that there is not room for them at Makiki, you could give them to my Japanese yardman. But I would suggest that seed which I send be carefully examined and allowed to germinate under cover, so in case there should, by any chance, be any larvae of beetles, you could detect them.

I have sent many more seeds that I wish to have you try and propagate. Some of the mailing tubes contain some new and rare altogether: plants and cuttings, and I only hope that my method and means of packing will at least carry, and that we may get a fair percentage of these to grow.

I have had to use coconut dust in lieu of spagnum moss, as the latter article is not to be had here.

I am sending one seed of the Brazil nut, *Bertholletia excelsa*, and trust I can find some way to get it on except by way of New York, which I am inclined to think will be too cold for it just now. I will have to leave it to you as to how you are to get the seeds out. (Sent via New York, Dec. 2, 1910.)

I have made notes in the annexed list of the things I sent today, to guide you as to how and where to plant. I am sure we shall have some interesting trees for Arbor Day, 1911.

I wish to get about a pound of Keawe seeds, *Prosopis juliflora*, cleaned from the pod, as well as a few good clean specimens of the bean. I desire to send them to the various islands where I will visit, and where I have made friends. You could put the beans in one of the mailing tubes, if the beans are now in season, and if there are none to have, we can send them after I get home in March.

It has appeared strange to me that the Keawe has never been introduced to the islands of the West Indies, but so far in my travels, I have not seen it, nor can I find any Creole who knows of its useful properties, as fuel or fodder. The island lacks a climate equal to Hawaii's, and it rains here every day. The heat is somewhat oppressive between the hours of 11 a. m. and 3 p. m., and at this time most of the inhabitants rest and remain in doors. The blacks are lazy and sluggish and the climate accentuates their desire to loaf and take it easy.

Trusting that the several packages which should go by way of Panama and San Francisco reach you in good condition, and hoping to hear from you at your early convenience, I am, with Aloha to the staff at the Station and a Merry Christmas and a Happy New Year,

Yours truly,

GERRIT P. WILDER.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Plak Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugh, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. VIII.

APRIL, 1911.

No. 4.

PHILIPPINE COLLEGE MAGAZINE.

From the Philippines comes an agreeable piece of printed evidence of the promotion of scientific agriculture in that group. This is in the shape of a new magazine called the Philippine Agriculturist and Forester, the second number of which has been received, which is published by the Student Body of the College of Agriculture, Los Banos, the first institution of the kind in the Philippines. It is explained in the advertisement of the magazine that the Student Body is "a joint society of the students," and the motive of the publication is made clear enough as follows: "We believe that the future of the Philippines depends upon its farms, and considering the methods of diffusing a knowledge of agriculture we endeavor to offer a paper which will prove practical to farmers and foresters; we hope it may also be useful to scientists. This, then, is our main aim in bringing forth the Philippine Agriculturist and Forester. We also realize the benefits that we can earn in preparing such a paper, not only in the knowledge of literature, but also in stimulation of harder work in the field of scientific investigations. We wish our readers to partake with us of the experience we may acquire."

One of the articles is on root crops, with the yautia the product treated, this being a West India plant scientifically named *Xanthosoma sagittifolium*, of which stock was imported into the Philippines some years ago by the Bureau of Agriculture. It is stated that, for local food, the yautia is one of the most important Porto Rican crops. The plant is described as in its habit very like the Philippine gabi, of which this remark is made: "The gabi, *Caladium Colocasia*, known more widely in English as taro, and in Hawaii as poi, is too familiar in the Philippines to need description." It will make the student who wrote this laugh himself when he learns that taro is only the modern Hawaiian spelling of the name of the plant, the older form being kalo, and that poi is the name of the chief native food made from taro.

In the destructive eruption of the Taal volcano in January the students had a most sensational as well as a unique opportunity of instruction. So near is the college to the volcano that, accord-

ing to the magazine's account, ashes began falling at the college within an hour from the initial explosion. "The entire college was aroused instantly, and Mr. Cuzner prepared at once to take such observations as would make the catastrophe as instructive as possible. * * * A chance to see and study the effects of a great volcanic eruption is worth more than a day of class work, even if the students were not too excited to think about their usual studies. Accordingly, the students were dismissed from classes, and some eighty of them, with Mr. Cuzner, Mr. Ledyard and the dean spent the day on a visit to Tanauan and the shore of Taal lake." Very interesting information is given in the article, which contains several illustrations, with regard to the varied effects of the falling ashes upon different kinds of crops and wild growths. The injury to maize, tobacco and sugar cane was great. "Lettuce, tomatoes, ferns and strawberries were badly damaged even at the college," the *Agriculturist* article says.

Other articles in the magazine are well illustrated and a full page frontispiece is a view of part of the exterior of the main hall of the college which indicates a handsome structure. The articles are highly practical and sensible in tone, for example the following reference to several insect pests reported: "The first step in the eradication of the above is to rid ourselves of the belief of our ancestors, that a failure of crops due to insect pests is brought about by Providence as a punishment for sins; the next is constant vigilance, and a third, ceaseless effort guided by correct methods."

Of interest to botanists, as well as students of the physical geography of Pacific islands, will be the "Proceedings of the California Academy of Sciences," fourth series, Vol. I, p. 7-288, dated January 20, 1911, which has just been received. It treats of the expedition of the Academy to the Galapagos Islands, 1905-1906, the major portion of the volume consisting of a botanical survey of the group by Alban Stewart, botanist of the expedition. "In preparing for this expedition," Mr. Stewart says, "the California Academy purchased the U. S. Ship Ernest, a two-masted schooner of eighty-seven tons burden, and after refitting, rechristened her the Academy. Our party consisted of eleven members as follows: R. H. Beck, chief; F. X. Williams, entomologist; W. H. Ochsner, geologist and conchologist; J. R. Slevin, herpetologist; J. S. Hunter and E. W. Gifford, ornithologists; E. S. King, assistant herpetologist; Frederick T. Nelson, mate; J. J. Parker, navigator; James W. White, cook; and myself, botanist. All of the scientific members of the expedition shipped as seamen, so that the expedition was made up mostly of sailor-scientists."

SOIL AMELIORATION.

By J. F. C. HAGENS.

II.

Correction of unfavorable conditions due to the natural location.

DRAINAGE.

But few cultivated plants will grow in swampy or constantly wet soils, particularly if the water is stagnant. This is not caused by any direct injurious effect of the water upon the plant but by the continued exclusion of the atmosphere. The presence of air in the soil is very essential to most plants. Water is a poor conductor of heat and wet soils are therefore usually cold. The wetter the climate and the greater the waterholding power of the soil the more necessary becomes the proper drainage of such soils.

The removal of the excess water promotes proper aeration of the soil, since air will fill the space formerly occupied by the water, and besides favorably affect the temperature of the soil. The chemical and biological processes, so necessary to plant life, take place under more favorable conditions and consequently more thoroughly.

The manner of drainage depends of course on the local conditions causing the excess moisture in the soil, which are manifold and require careful study before a definite plan of action is decided upon. Frequently we find unfavorable subsoil conditions which prevent the usual downward movement of the soilwater and in such case the removal of the excess water is best accomplished by a proper system of drain ditches, following the natural slope of the land. Where the land, to be drained, is level with, or below the level, of a nearby river, lake or the ocean the water must often be pumped out of the main ditches to accomplish the desired results. Low lands, situated near the ocean, often become salt wastes after they have been under cultivation for a considerable period. This is due to change brought about in the condition of the soil through the cultivation. The salty subsoil water, by capillary attraction, rises to the surface and is there evaporated, leaving its solids in the form of a salty crust or shining crystals. Unless occasional heavy rains dissolve them and carry them off such deposits will gradually become heavier and heavier. This surface washing is only possible where the land has a natural slope; on level low lands drain ditches must be built to accomplish it.

Soils are drained either by under-drains or surface-drains. As a rule drainage by a system of open ditches is the most practicable and economical, particularly where land is comparatively cheap and where large bodies of water must be removed. On the other hand where land is valuable and where only moderate quantities

of stagnant under-ground water are to be drained off, under-drains are most efficient and practicable.

The building of a permanent drainage system requires careful study of the local conditions, the lay of the land, amount of water to be removed, nature of the soil, etc. It is perhaps hardly necessary to describe the building of the ordinary open drain ditches, as this is too well known to all connected with agriculture. A few words on under-drains might, however, be of interest.

Often a layer of heavy impervious clay or other material will prevent the water in the surface soil from penetrating the sub-soil and by opening this blanket or hard pan at certain intervals communication between the surface soil and the lower strata is

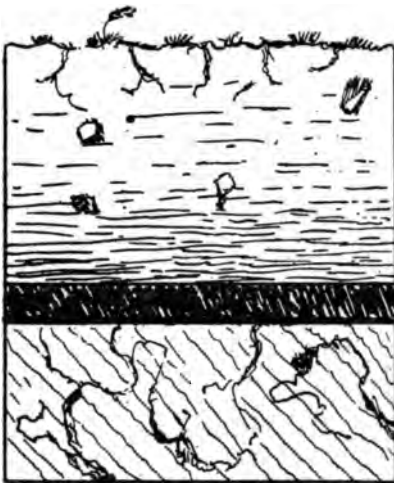


Fig. 1

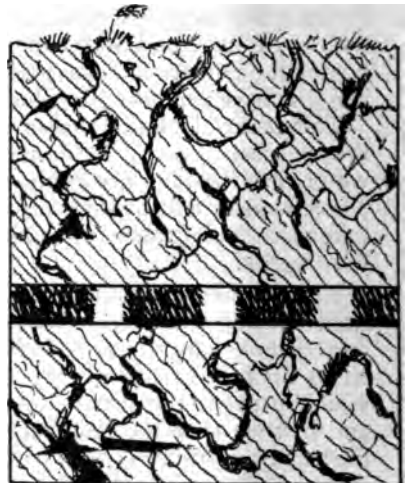


Fig 2

established, allowing the excess water in the surface soil to drain off; see figures 1 and 2.

Under-drains are built in the same manner as the open drain ditches, the bottom of the ditch is thereupon filled with coarse stones, loosely packed for about 12 to 15 inches over which a layer of small pebbles is placed; the latter is covered with grass-sods, straw or similar material and then the whole ditch is filled with earth again. Care must be taken that the original surface soil is placed on top again.

Excellent results have been obtained in the United States and Europe with drain tiles. Porous tiles of baked clay are used and laid carefully at a depth to suit conditions and according to the natural lay of the land. These tile drains are laid parallel to each other as much as possible, and in the direction of the

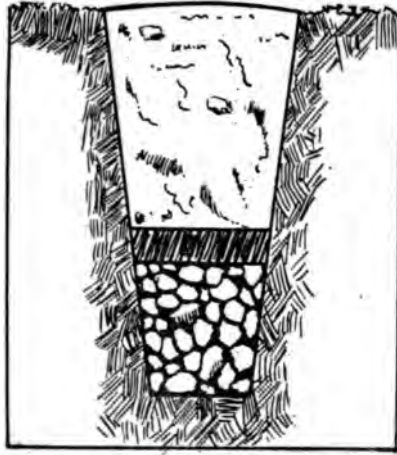


Fig. 3

With this method there is no loss in area and yet a good drainage is usually obtained.

heaviest decline of the field. At convenient places mains are laid which collect the water from the laterals and conduct it to the main outlet.

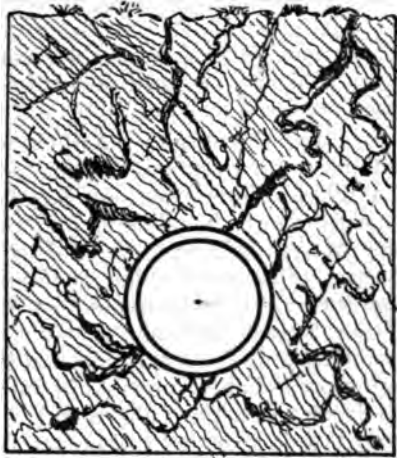


Fig. 4

Change of soil structure due to drainage.

(To be continued.)

BOARD OF AGRICULTURE AND FORESTRY.

Minutes of the meeting of the Board of Commissioners of Agriculture and Forestry, held in the Throne Room, at the Capitol, on Thursday, January 19, 1911, at 10:00 a. m.

Present: Marston Campbell, President and Executive Officer; Messrs. D. P. R. Isenberg, H. M. von Holt and Albert Waterhouse, members.

ENTOMOLOGY.

Importation of the Banana Fruit, Banana Shoots or Plants.—President Campbell read the opinion drawn up by the Deputy Attorney General, Arthur G. Smith, in regard to the right of the Board of Agriculture and Forestry to prohibit the importation of banana fruits, shoots or plants from certain localities. He also read Rule VIII pertaining thereto.

Mr. Waterhouse stated that the existing blight makes the importation decidedly dangerous. He wants to see a law put into effect which will absolutely prohibit all importation of banana fruit, shoots or plants from other countries, and if the Board cannot make such a ruling its power is very much hampered. We must frame a rule for the protection of the banana industry here.

After some discussion the President suggested that the Attorney General's opinion be placed on file, that he be thanked for the same, and that the case be turned over to the court for decision.

Mr. Waterhouse stated that he thought federal restrictions would be good.

The Deputy Attorney General was then summoned. Mr. Waterhouse expressed to him his desire to make this law one of absolute prohibition.

After further discussion Mr. Smith stated that the customs between foreign nations are a question for the federal authorities and requested that it be referred back to the Attorney General with instructions that the same be taken up by him, for the Board, to the Secretary of Agriculture. Federal action would then be based upon evidence, after reasonable examination.

Waterhouse stated that an entomologist must of necessity examine the matter of the deepest kind, and the rule must go farther and simply prohibit plants from entering that have been placed in a dangerous region. No bananas should be introduced into the country from any part of the world.

Mr. Smith stated that it occurred to him the law as drawn up was not so stringent as the Board would want.

President Campbell again read Rule VIII as amended by the

Board. The regulation VIII as prepared by the Attorney General was adopted. It was also stated that the

Executive Officer take up the matter of law pertaining to the importation of fruits, plants, etc., with the Attorney General with an idea of securing aid from the Secretary of Agriculture, at Washington.

COMMUNICATIONS.

Letter to Prof. Dr. Ignatz Urban.—The chairman read letter to Prof. Dr. Ignatz Urban, Director of the Royal Botanic Garden, Berlin, Germany, dated January 6, requesting the loan for a short time of herbarium specimens of certain genera of Hawaiian plants, for the purpose of comparing the same with a large collection of material of the same genera recently gathered by the Board's botanical assistant, in order to facilitate correct identification; the same to be returned to the Royal Botanic Garden at Berlin immediately upon completion of the comparison.

Passion Vine.—The chairman read letter also to Mr. A. F. Griffiths, president of Oahu College, calling attention to the spread of an injurious plant on this Island, a patch of which is near the College grounds, and suggesting that this be dug up and burned. This plant, namely, passion vine (*Passiflora triloba*), called also huamakani by the Hawaiians, if eaten by calves, produces paralysis of the entire nervous system, brings on convulsions and high temperature and finally causes death. Unfortunately this is somewhat widely distributed on the windward side of Oahu.

President's Resignation.—President Campbell read to the members of the Board letter dated January 19, as follows:

"Gentlemen:—I beg to inform you that I have this day tendered my resignation to Governor Walter F. Frear as President and Executive Officer of the Board of Agriculture and Forestry, same to take effect upon the appointment of my successor."

In explanation he stated that he cannot devote the time to the Board that it should have on account of the constantly increasing demands on his time from the Lands, Survey and Public Works Departments, and that he deeply regretted the necessity of such action, as the work had been one of absorbing interest.

Mr. Campbell stated that he will aid all he can in legislative matters and in all matters pertaining to the apportionment of the revenue from the special conservation-immigration income tax. The members expressed their great regret at this action of the President and Executive Officer.

Mr. Campbell then announced as members of the Finance Committee Mr. Albert Waterhouse and Mr. D. P. R. Isenberg, the former as chairman.

Minutes of the Meeting of the Board of Commissioners of Agriculture and Forestry, held in the Library of the Government Nursery on King street, Friday, February 24, 1911, at 2:00 o'clock p. m.

Present:—Marston Campbell, President and Executive Officer; Messrs. D. P. R. Isenberg and Albert Waterhouse, members; E. M. Ehrhorn, Superintendent of Entomology, and R. S. Hosmer, Superintendent of Forestry.

FORESTRY.

The Superintendent of Forestry submitted his routine report for the months of January and February, 1911, dated February 24, which was approved.

District Fire Wardens.—Mr. Hosmer submitted a letter, addressed to the Board, recommending the appointment of district fire wardens as follows: Mr. Alexander Smith, manager of Paauhau Plantation, for the District of Hamakua, Hawaii; Mr. A. Menefoglia, manager of the Wainiha Power Plant, for Wainiha, Kauai; Captain Frank Dalton, homesteader in Palolo, for Palolo Valley; Mr. Byron O. Clark, of Honolulu, for Manoa Valley.

It was moved and seconded that the gentlemen suggested by the Superintendent of Forestry as district fire wardens be appointed. Carried.

Congressional Seed.—Having received the annual quota of free congressional vegetable seed, sent by the Delegate to Congress, the Secretary was requested to prepare a notice for publication in the columns of the local papers, that seeds will be distributed on application to the Seed Clerk of the Board.

FORESTRY.

Investigation Koolau, Maui, Forest.—Mr. Hosmer announced that he expected to make a trip to Maui some time during March to inspect the forest in the Koolau district in company with Mr. H. M. Curran of the Philippine Bureau of Forestry. This visit was to be made as a part of the investigation of the diseased forest in that district and the area for which the Alexander & Baldwin plantation interests had requested the Division of Forestry to prepare a planting plan. It is proposed to try a considerable variety of exotic trees in the area where the native Hawaiian forest was killed off some years ago. Finding that Mr. Curran was to pass through Honolulu, both this Board and the Hawaiian Sugar Planters' Association Experiment Station, who at that time had charge of the experimental planting, requested Mr. Curran to stop over, visit the district and make suggestions as to what Philippine trees might be used to advantage. Mr. Curran is expected to arrive some time about the middle of March.

ENTOMOLOGY.

The Superintendent of Entomology submitted his routine report

for the month of January, and that of his assistant, Mr. H. O. Marsh, for the months of December, 1910, and January, 1911. These were accepted and ordered placed on file.

Importation of Birds.—Mr. Ehrhorn read a communication from Mr. W. S. Wise, of Hilo, president of the Keaukaha Rod and Gun Club, addressed to the Board under date of February 6. This club has interested itself in the importation of fish, game birds and oysters, and is desirous to obtain a permit at this time for the purpose of introducing into these Islands some of California's red-winged blackbirds. The Entomologist read his reply to the foregoing, in which he enclosed copy of a letter to him from Dr. H. W. Henshaw regarding the Brewer blackbird, and setting forth the risk of importing birds and the great care that should be exercised in order that those brought here will not change their habits.

Mr. Ehrhorn then read his report to the Board regarding this matter, embodying the recommendations of Dr. Henshaw, and stated that he would recommend the Board to discourage the importation of any bird until we had the facilities for thoroughly testing their habits under close observation, in charge of a well qualified ornithologist. The Board acquiesced in Mr. Ehrhorn's recommendation, and advised him to so notify Mr. Wise, enclosing a copy of his report.

During the discussion which followed Mr. Ehrhorn said that while in Germany he found that a great deal of encouragement was given bird-culture in the various parks by assisting the smaller species from being attacked by other birds, such as the robin and bluejay, which are the destroyers of eggs and nests. He also stated that private individuals would place neat little houses of wood furnished with a small opening just large enough to allow a certain sized bird to enter. These houses were fastened in the trees and were always occupied, and prevented larger birds from disturbing the smaller species during the nesting season.

Mr. Isenberg said he made the same observations during his travels in Europe, and thought that something along this line might be done on these islands.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, March 17, 1911.

Hon. Marston Campbell, President and Executive Officer, Board of Agriculture and Forestry, Honolulu.

Sir:—I beg to submit herewith my report on the work of the Division of Animal Industry since the last meeting of this Board on February 24, 1911.

TUBERCULOSIS CONTROL WORK.

Since the preliminary test of the dairy herds of the City and County of Honolulu was terminated in November of last year

showed them to be affected with tuberculosis, two to such an extent that the carcasses were condemned. On December 12th the three remaining reactors were submitted to the intra-dermal test, being used as checks on a number of small Japanese herds which were injected at the same time and in the same manner, all receiving intra-dermal tuberculin (O. T. Ser. Dil. No. 5) from the same package. While the Japanese cows, all of which were either fresh or else had passed the subcutaneous test failed to show any reaction, the three previous reactors of F. C.'s all showed large typical swellings indicative of the presence of tuberculosis. F. C.'s remaining herd, which in the meantime had been replenished with ear tagged (healthy) animals to the number of 26, was submitted to the intra-dermal test on February 14th with the result that all the 26 passed, which demonstrated that the segregation and disinfection of the premises had been effective. It may be added that F. C.'s dairy premises rank among the best in the city.

In contrast to this case may be quoted the herd of J. P. M. On July 5 to 6 last year this herd consisting of 14 cows was submitted to the subcutaneous test with the result that 9 passed and 5 reacted. When on March 8 of this year the herd then consisting of 12 animals was given the intra-dermal test there still remained on the premises 3 of the previous reactors, not segregated. The result was that 3 of the previously passed cows gave typical reaction, leaving 6 reactors and 6 passed as compared to 3 reactors and 9 passed. This case illustrates the rapid spread of the disease where no effort to segregate the reacting animals is made. A similar case is that of A. P. who on June 29 to 30 had his herd of 12 cows and 1 bull tested subcutaneously, one cow reacting. This cow was allowed to remain on the premises as a result of which the intra-dermal test, when applied to the herd on March 7 of this year, showed that the bull, as well as the same cow, which was injected as a check, gave reaction. This time the owner did not lose any time in disposing of the reactors, and it must be admitted that he was convinced to such an extent as to favorably influence several of his compatriots in the milk business to go and do likewise. Another herd, consisting of six cows and tested by the old method of July 14-15 last, giving one reactor which was allowed to remain with the others, gave, when tested by the new method two reactors, one being the previously admitted one.

In only two cases where previous reactors were admitted as checks did they fail to respond to the intra-dermal test. One was a very fine fat cow giving 18 to 20 quarts, and being the only reactor in a herd of 13 animals. When retested by the new method on February 13th this year, being admitted to the test as a check, it gave no reaction. This animal must therefore be considered as a past reactor, which, however, does not mean, that there are no tuberculous centers or foci in the system. It simply means that there is a temporary but not likely a permanent cessation of activity on the part of the infection, with possible encap-

does in no way insure against a recrudescence of the disease at any time when the animal's power of resistance, through disease, advanced age or unfavorable sanitary, climatic or dietetic conditions becomes reduced or impaired, and when, without notice or warning, the animal may begin to excrete virulent tubercle bacilli and scatter the infection broadcast. Besides, there remains the possibility of a faulty injection. To allow this animal to remain in close contact with sixteen healthy animals is therefore taking chances which are absolutely unwarranted and which are strictly against the recommendations of the best authorities on the subject.

The actual retest of the Honolulu dairies, by means of the new method began on February 8, since which date more than one thousand head in approximately seventy dairies have been tested. Two of the largest dairies, with an aggregate of 200 head, will be tested during the first part of this week, after which the dairies outside of Honolulu will be tested.

While the first test (subcutaneous) revealed the presence of over 500 head of tuberculous animals in the same herds, the present test has, so far, only added 45 new reactors, with 11 suspicious and 8 held for retest. Thirty-one of the previously condemned animals were admitted to the second test as checks and 29 of these reacted to the new method also. Twenty-four animals, which had passed the subcutaneous test, reacted to the intradermal, showing that they either had the infection in them at the time of the first test, though not sufficiently developed to cause a reaction, or else that they became infected from reacting animals left on the premises.

How many of the old reactors have already been killed and how many are segregated or kept on the premises cannot be stated with any accuracy at the present time. The appended record shows about fifty reactors retained on various premises, but many of these will be either segregated or butchered as soon as possible.

It is however gratifying to report that the number of clean dairies, that is, dairies producing milk from healthy tuberculin tested and passed cattle only, is steadily increasing, and that it will not be long before the dairies which still retain their reacting animals will see themselves constrained to dispose of them or else lose their customers. There is hardly a day passes when this office does not receive inquiries as to the cows belonging to, or the milk produced by, someone or other dairy man. Before replying to such inquiries the party in question is either interviewed or communicated with over the telephone, unless it is known that his herd is clean. But as in most cases it is only a question of getting rid of one or two cows, the respective owners are given an opportunity to do so before an adverse report is made and a customer is lost for them. For this same reason it is recommended that the appended list of dairies with the respective number of cows tested, passed, reacted and retained or disposed of—be not published at the present time as a number of those which the

list shows as still having reactors on the premises are willing to dispose of them as soon as it can be done without sacrificing them entirely. The failure to obtain pastures for segregation has compelled many dairy owners to retain animals on their premises which otherwise would have been removed long ago. For the same reason it became necessary to abandon the distribution of the circular letter to applicants for milk permits, as it stated that such pastures for segregation would be provided. There are consequently a number of dairy men who are compelled to retain the reactors until it is definitely settled whether the present legislature will provide for a partial indemnification of owners of tuberculous animals as outlined in the appended skeleton bill.

All of the four deputy territorial veterinarians report the testing of a various number of herds, all of them having either adopted or experimented with the intra-dermal test which has been explained or demonstrated to them by this office. The deputy from Maui arrived in Honolulu yesterday for the express purpose of familiarizing himself with the new method and is now receiving instructions in the practical application of the test, the Moanalua herd being injected today. The appended correspondence from the various deputies will show the activity in tuberculosis control work which has been created through the efforts of this office. They have all found more or less difficulty in gauging the insertion of the needle, but as this is merely a matter of practice there is little doubt that they will adopt the new method, if not entirely, at least as supplementary to the subcutaneous method and when range cattle are to be tested.

The present retest of the local dairies has so far been performed entirely by the Assistant Territorial Veterinarian, Dr. L. N. Case, assisted by Mr. Richards, the Milk Inspector of the Board of Supervisors. As already stated the present week will see the work finished in the City proper when the activity will be extended to the country.

IMPORTATION OF LIVE STOCK.

Since the last report only one consignment of large animals, consisting of 11 head of mules and 2 horses, has arrived here. Every steamer has, however, brought the usual number of crates of poultry and of dogs all of which have been inspected.

HILO QUARANTINE STATION.

The consideration of the Board in regard to an animal quarantine station for the Port of Hilo is again urgently required, and the appended correspondence from Dr. Elliot is presented in support thereof.

To compel owners to quarantine their horse stock on premises designated by the authorities and to fail to provide the same cannot be enforced any longer. The last consignment of 102 mules,

kept in quarantine at the old race-track in Hilo, cost the importers \$343, exclusive of feed, simply for use of the premises. This condition must be remedied and Dr. Elliot's recommendations which are based upon careful inquiry, seem to be the only solution of the question.

A bill for the partial indemnification of owners of tuberculous animals is now under preparation and will be submitted to the Committee on Animal Industry for approval.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

ENTOMOLOGICAL INVESTIGATIONS.

Honolulu, January 31, 1911.

Mr. E. M. Ehrhorn, Superintendent of Entomology, Board of Agriculture and Forestry, Honolulu.

Sir:—I submit the following report concerning my entomological investigations for the months of December, 1910, and January, 1911:

The study of the alligator pear mealy bug, (*Pseudococcus ninae*, Mask.) was continued during December and a number of additional insecticides were experimented with. The following formula has proven very effective:

"Black Leaf 40".....	1½ ounce.
Whale-oil soap	4 ounces.
Water	4 gallons.

Small, easily reached trees can be entirely freed of mealy-bugs by one very thorough spraying, but with large trees, at least two applications are usually necessary. Unfortunately this solution is rather expensive, but where only a few trees are to be sprayed, it can be highly recommended.

Two miscible oils, Sealecide and San U Zay scale oil, have also proven very effective in killing the "bugs." Sealecide was tested at the rate of 1 part of oil in 24 parts of water and San U Zay scale oil at 1 part in 30. When used in these proportions, apparently every "bug" which came in contact with the spray was killed.

It is an unfortunate fact that all of the insecticides which have been tested at a sufficient strength to kill the mature mealy-bugs have burned the tender pear foliage to a greater or less extent. Guavas and other plants with tough foliage were not injured.

The study of cabbage pests required considerable time during December and much progress was made in dealing with these insects.

I am pleased to be able to report that Mr. W. R. Haley, 715 Quarry street, Honolulu, has taken up the business of spraying, for various insect pests, on a commercial basis. It is now possible for persons having insect infested trees or plants to employ Mr. Haley to give them proper treatment. It too frequently happens that when an effort is made to combat insect pests the work is trusted to ignorant and unskilled "yard boys" or other help. Under such circumstances the results are usually failures. Mr. Haley, however, is prepared to do expert work and his services will fill a long felt want in Honolulu. It has been my pleasure to be with Mr. Haley on several occasions and to offer him the benefit of my experience in fitting up spraying apparatus and in preparing and applying insecticides.

During the last few days of December and the first part of January my work was interrupted by illness. Owing to continued ill health I shall be obliged to return to the mainland.

No experimental work has been undertaken during January. My time has been devoted to writing reports and notes and to closing up finished experiments. So far as I have been able, I have endeavored to pick up the "loose ends" of my work, with the intention of getting my affairs in as good condition as possible before my departure in February.

Respectfully,

H. O. MARSH,
Assistant Entomologist.

REPORT FOR FEBRUARY.

Honolulu, February 28, 1911.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu.

Gentlemen:—I respectfully submit as follows my report of the work of the Division of Entomology for the month of February.

During this month my assistant and I boarded 24 vessels and we found fruits, vegetables and plants on 14 of them.

The usual careful inspection was made of all shipments with the following result:

<i>Disposal with principal causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	757	10,635
Fumigated	13	53
Burned	29	29
Total shipments	799	10,717

Rice Shipments.—The rice shipments from Japan during the month amounted to nearly three times as much as the shipments of last month, there being 16,560 bags which, after thorough inspection, were found free from weevils and other pests.

Pests intercepted.—As the planting season is at hand quite a number of plant shipments arrived during the month, in all 156 packages containing 3,431 plants. All shipments took the usual course of inspection and fumigation. The Japanese shipments in particular occupied our special time and the following insect pests were found:

On palms from Florida *Aspidiotus cyanophylli*, on orange trees from Florida *Lepidosaphes beckii*. Crawling about the cases containing plants from Japan we found larvae of the Gypsy moth and some smaller caterpillars belonging to the leafrollers (*Tortrix* sp.) Some of the leaves of the citrus plants showed signs of leafminers and all leaves were removed and destroyed. We again found a few Bagworms (*Thyriodopteryx* sp.) on Camellia and other plants. Several Scarabeid and Staphylinid beetles and the larvae of Elateridae and other grubs were found in the soils and the refuse of the boxes. We always examine each plant and remove all pupae or cocoons found attached to them. After fumigation these are dead but for safety it is best to remove them. All soil which is taken off of the plants is treated with Carbon bisulphide for 48 hours, as we often find that ants and other grubs which are hidden too deeply in the soil escape being killed by the Hydrocyanic acid gas and Carbon bisulphide fumes will penetrate into the soil in our galvanized garbage cans. We found the following scale insects on these shipments: *Hemichionaspis aspidistrae* and *Coccus hesperidum* on *Rohdea japonica*. *Lepidosaphes euryae* on *Camellia*, *Aspidiotus perniciosus* on Pear trees, *Ceroplastes ceriferus* on *Camellia* and *Aulacaspis pentagona* on Cherry trees. Whenever plants are found too seriously infested, they are confiscated and destroyed.

Brother M. Newell, Inspector at Hilo, reports the arrival of 9 vessels of which 3 carried vegetable matter consisting of 87 lots and 1,340 parcels. Of these one case of trees was fumigated and 10 sacks of potatoes infested with Eelworms or Nematodes (*Heterodera radicola*). This is a new pest attacking potatoes and although we have this pest attacking nearly all of the roots of many fleshy plants, it is well to keep out infested material. California recently found a lot of potatoes infested with *Nematodes* shipped into the State from one of the western States and made the consignee return the whole shipment.

Beneficial insects.—During the month two colonies of parasites (*Pteromalus puparum*) of the Cabbage butterfly were liberated and one lot of Japanese fungus distributed.

Very truly yours,

EDW. M. EHRHORN,
Superintendent of Entomology.

REPORT ON BIRDS.

Honolulu, February 14, 1911.Hon. Board of Commissioners of Agriculture and Forestry.
Honolulu.

Gentlemen:—Regarding the importation of the red-winged blackbird, as mentioned in a letter from Mr. W. S. Wise of Hilo, I desire to state that I think it best to abide by the advice given in the report of Dr. H. W. Henshaw in which he quotes the following in speaking of the danger of importing seed-eating birds.

"The Brewer's blackbird might possibly prove an exception to the rule, but it is exceedingly gregarious in fall and winter, and any birds that assemble in large flocks are to be regarded with suspicion as they are capable of inflicting great damage on crops, when they turn their attention to them."

If the Board should decide to allow the importation of blackbirds, I would suggest that some provision be made to have a large observation cage built in which the birds could be closely watched and that a competent person be given full charge of this work.

Since receiving Dr. Henshaw's report there has been quite a lot of discussion pro and con on bird-introduction and while every one will concede that bird life would add greatly to the charm of the Islands, yet for the sake of our growing agricultural industries, we should use every precaution in the importation and distribution of birds. I believe, that by building proper aviaries, large enough to have ample room for test plots of rice and other seed crops under cultivation and then having the work of observation carried on under direct supervision of a competent ornithologist, we shall be able to select a few birds, which would be a good acquisition to our fauna. Without such provisions and funds for maintaining them, the importation of dubious birds should not be sanctioned.

Respectfully yours,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

Honolulu, February 24, 1911.

Board of Agriculture and Forestry, Honolulu, Hawaii.

Gentlemen:—I have the honor to submit the routine report of the months of January and February, 1911, as follows:

FOREST RESERVES.

On January 28, 1911, a public hearing was held by the Governor and the Board to consider the creation of a forest reserve in

South Kona, Hawaii, and setting apart of additional forest areas adjoining the Kau, Hawaii, and the West Maui Forest Reserves. On February 4, Governor Frear signed proclamations making the two additions. The proposed South Kona Forest Reserve is temporarily held up, until certain changes can be made in the technical description, whereby there will be eliminated from the area proposed to be set apart two tracts for which there are applications for homesteading.

FOREST EXTENSION.

During the past two months additional shipments of seedling trees in seed boxes have been made to several of the large corporations that are actively engaged in tree planting. This method of tree distribution seems to be acceptable to many persons, as it obviates the losses that frequently occur, especially from the damping off fungus. In his report, Mr. Haughs gives the details of this distribution.

CONGRESSIONAL VEGETABLE SEED.

During the past month this office has been distributing the quota of free congressional vegetable seed, sent annually by the Delegate to Congress. As usual, packages of the seed have been sent to the public schools throughout the Territory, for the pupils to use in the school gardens. And a special effort has been made to get seed into the hands of small land holders throughout the Territory, packets having been sent to a carefully selected list of persons on each island. Some seed still remains available for distribution. Applications for it should be addressed: Seed Clerk, Board of Agriculture and Forestry, Box 207, Honolulu, Hawaii.

ANNUAL REPORT.

A large share of the time of the various members of the staff, especially of the Superintendent of Forestry, has been taken up during the present two months in the preparation of the report for the past biennial period and in the details of getting it ready for and through the press. It is expected that the report will appear very early in March.

MEETINGS.

The Board building continues occasionally to be used for the meetings of the organizations more or less closely affiliated with

the Board—especially by the Hawaiian Poultry Association. One such meeting was held in February.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

NURSERYMAN'S REPORT.

Abstracts from the reports of Mr. David Haughs, Forest Nurseryman for December, 1910, and January and February, 1911.

DISTRIBUTION OF PLANTS.

	In seed boxes.	In boxes transplanted.	Pot grown.	Total.
		December, 1910.		
Sold	56,000	3,350	4,288	63,638
Gratis	4,000	400	165	4,563
	<hr/> 60,000	<hr/> 3,750	<hr/> 4,453	<hr/> 68,203
		January, 1911.		
Sold	47,000	7,000	236	54,236
Gratis .....	.....	770	2,281	3,051
	<hr/> 47,000	<hr/> 7,770	<hr/> 2,517	<hr/> 57,287
		February, 1911.		
Sold	67,000	250	800	77,050
Gratis .....	.....	...	760	760
	<hr/> 67,000	<hr/> 250	<hr/> 1,560	<hr/> 77,810

In December \$120.75, in January \$38.65, and in February \$75.90, was received for seed and plants sold. These sums have been deposited with the Treasurer of the Territory as realizations.

The 56,000 seedlings sold in December consisted of Blue Gum and Ironwood and were parts of the orders received from the Waialua Agricultural Company and the Honolulu Plantation Company.

In February, 67,000 plants in seed boxes were sent to Waialua and Honolulu Plantations, parts of the plants ordered by the two companies during the month of August, 1910. The former company at that time ordered 100,000 Blue Gum and 50,000 Ironwood and the latter 100,000 Blue Gum and 25,000 Ironwood. To reimburse us for labor and boxes the following agreement has been made with the managers of the two companies concerned: Honolulu Plantation Company will pay for three men during the month of March, two at \$33.00 per month and one at \$10.00, the balance to be made up by giving us \$29.00 worth of

box shucks. The Waialua Agricultural Company will pay for three men for the month of April, two at \$33.00 and one at \$30.00, leaving a balance of \$22.00 for box shucks, making a total of \$118.00 for 118,000 plants delivered to date. The balance of the plants, namely 32,000 Ironwood, will, at the request of Mr. Goodale, be supplied next winter. The order for the Honolulu Plantation is completed, with the exception of a few boxes of Ironwood which will, at the request of the manager, be furnished later.

Since the end of December only one man has been employed in the work of attending to the grounds at the Government Nursery. He, with the help of two prisoners, has to keep the grounds and walks in as good condition as possible. In the Nursery one man is kept making boxes, potting and transplanting. Barbaso, the other man, who spent part of his time assisting in keeping the grounds in condition and also assisting in potting and packing up plants, was discharged at the end of the year, leaving just one man for the plants and one for the grounds.

Experiment Garden, Makiki.—One man was discharged at the end of December, leaving two men to do the work. All the soil used for seed boxes and potting at the garden and also at the Government Nursery is carted from Punchbowl after which it is mixed with sand and manure and then sterilized. This entails a good deal of work, both for the two men and also the wagon driver. The latter spends most of his time carting soil, sand, and firewood, also plants to and from the Nursery as well as plants sent to the other islands.

A large number of species of Eucalyptus, new to the Territory, are being propagated at the garden for the Federal Experimental planting.

THE USE OF PLANT MATERIALS IN NATURE STUDY TEACHING.

By PROFESSOR VAUGHAN MACCAUGHEY,
College of Hawaii.

The teaching of nature-study,—sympathy with the things of the out-of-doors,—has now a recognized position in the curricula of the elementary schools. The general principles of such teaching are well-defined, and its interrelations with other school activities have been elucidated by pedagogs of renown. Questions of special method and special materials, being more localized in their applications, differ widely in various regions. Lessons concerning the autumnal coloration of foliage, the crystalline structure of snow flakes, or the hibernating habits of amphibia, would be obviously inappropriate in the schools of Hawaii.

Abundant and varied plant life is a marked characteristic of these verdant mid-Pacific isles. In the vicinity of every schoolhouse, in country or in city, there is an unlimited supply of plant material. The green hedge, starred with bright hibiscus blossoms, the waving cocoa-palms, leaning seaward, the curious pond weeds in the taro patches and in the rice patches, the taro plants and the rice plants themselves, the rocky hillside, panini covered; the velvet manienie lawn, the flowers about the doorstep—all these, throughout the school year, afford an unusual wealth of plant material for nature-study lessons.

It is the purpose of this series of papers to point out somewhat in detail the usefulness of this plant material, and to suggest some methods whereby teachers may profitably employ it in their work.

The Purpose of Nature-Study.—It is advisable at this point to consider briefly the fundamental objects of nature-study, in order to properly orient our study therewith. The gist of the matter is well expressed in these two quotations:

"Nature-study is learning those things in nature that are best worth knowing, to the end of doing those things that make life most worth living."—Hodge.

"By nature-study a good teacher means such a study of the natural world as leads to sympathy with it."—MacBride.

The distinctions between nature-study proper and such pseudo-forms as the so-called "elementary science" and "object-lesson" teaching must be clearly understood; failure to do so results inevitably in serious pedagogic errors. The aims of science teaching are not the aims of nature-study; the latter is not belittled science. Science is, in many ways, a drill study, which true nature-study is never. The taxonomic phases of all biologic science are irrelevant to nature-study work, which deals not with systems nor codes, but with the simple and child-interesting phases of nature. Science leans heavily upon textbooks, nomenclature, and analysis; nature-study sees the world from the fresh, unobscured eyes of childhood. Science finishes the subject; nature-study begins it; one has the seal of finality, the other the outreaching attitude.

The investigative mind, the concrete experience and first-hand problem-solving, the larger and more constant enjoyment of nature, the proper understanding of nature as related to man's own problems—these are the aims of nature-study. (See *Nature-Study Methods, Syllabus of Lectures*, by Anna Botsford Comstock, Cornell, 1905.)

Nature-Study as a Part of Public Education.—There have been many written and spoken discussions of this topic in recent years, but little is necessary here. The salient facts of the

case were well stated by the sagacious William Penn many years ago, as follows:

"We are in pain to make them scholars, and not men; to talk rather than to know, which is true canting. The first thing obvious to children is what is sensible, and that we make no part of their rudiments. We press their memory too soon, and puzzle, strain, and load them with words and rule to know grammar and rhetoric, and a strange tongue or two, that it is ten to one may never be useful to them; leaving their natural genius to mechanical, physical, or natural knowledge uncultivated and neglected; which would be of exceeding use and pleasure to them through the whole course of their lives."

Nature-study is officially recognized and provided for in the elementary schools of Hawaii. The topics for each grade are specified. The Territorial Normal and Training School, through its Department of Natural Science, then in charge of Mr. Vaughan MacCaughey and Miss Louise Gulick, has issued a "Preliminary Synopsis of Nature-Study Work for the Elementary Schools of Hawaii." This contains classified subject-matter, in outline form, for the various required subjects. The plant subjects thus outlined are: avocado, banana, cocoanut, coffee, cotton, flax, guava, mango, manila hemp, palms, papaia, rice, sisal, sugar cane, sweet potato, tamarind, taro, watermelon. A revised outline for the taro is given here in full, to illustrate the general arrangement and content of these subjects.

TARO.

Field Crop—Food for Man.

Lesson One—Description. General Description of the Plant.—One to five feet in height. Long-stemmed, large, heart-shaped leaves. Infurled leaves growing from summit of corm. Flowers appear only rarely; yellow, and similar to calla blossom. Fertile seeds rarely developed, and therefore plant is not propagated by seedage.

Description of Part of Economic Importance.—Corm is the starchy portion which has the most value as food. Size of large sweet potato. Blue-gray color, sometimes tinted with pink. Upon it may be seen scars of former leaves. Roots grow from it at axils of former leaves. Buds also present, and may grow into new plants. Growth of corm.

Varieties. Numerous. In ancient times, at least forty-five kinds known in these islands. Still other kinds known in other lands. Differ in size, form, color, quality, flavor, time required for maturity, amount of water needed for growth, etc. Two large divisions—wet-land-taro and dry-land-taro; the former chiefly raised.

Lesson Two—Distribution. History and Present Distribution. Taro and related plants have been under cultivation as long and perhaps longer, than any other crop. Probably a native of India; migrating from there to Ceylon, Sumatra, Malaya, China, Japan, and Egypt. More recently to Fiji and New Zealand. From New Zealand to Samoa, Tahiti, and Hawaii. Japanese taro (sato-imo) entirely different from Hawaiian taro.

Factors Limiting Distribution. Warm climate; heavy, moist, rich soil; good water supply. Usually in valley bottoms.

Lesson Three—Raising the Crop. Preparation of the Land.—Suitable location found; usually valley with stream. Best region is near lower course of stream, because land is low and level, and water has good head. Land cleared. Size of patches determined. Patches arranged in terraces, so that water can flow from one patch to another. May be large or small and shaped according to the contour of the land. Soil broken by pick. Embankments built around patch. Ditches constructed to bring water. Water turned into patch, and is soon soaked up by broken soil. While soil is still wet, is plowed again and again, and harrowed. Sometimes horses or cattle turned in to break lumps and to make soil soft. Lumps of sod and stones picked out and put on embankments. Banks wet with water, and mud trampled upon them to make them solid; smoothed over with shovel. Water turned in and left for few days, so that ground becomes soft and muddy. Water then drained off.

Planting. Huli is planted in soft mud. Huli is slice taken from the top of a mature corm, together with the leaves cut down to a height of about six inches. If huli is taken from immature taro, it is liable to develop the disease known as "taro rot." Hulis are piled on embankments and covered with grass to prevent drying out, until used. Sometimes hulis are planted in hills — mud brought together with the hands until it stands above the water. Four or five hulis planted in each hill. Usually planted in rows, one to three feet apart, according to variety. Small, temporary ditches are often run between every five or six rows to keep moisture uniform.

Lesson Four—The Growing Plant.—Water not allowed to reach patch for several days, so that huli may become fixed in the soil. Then a small amount of water admitted, filling the patch, but not flooding the taro. If plants are flooded too soon, they will rot at the base of the plants. After a period of about thirty days the growing plants have become rooted and the leaves have developed. The patch is cultivated by hand between the rows. After the first water is left until taro is ripe. Taro grows by means of continual circulation. During first six months the plants are not weeded; dead leaves are pulled off and trampled down. After six months no weeding done, as taro is too large to weedeasily. After six months the corm

remains small and tapering like a carrot; then it swells rapidly and becomes oval or rounded. When leaves begin to turn yellow, taro is ripe. Taro, from planting to harvesting, requires 12 to 15 months, although the Chinese, to gain time, usually pull it before it is ripe. If plant has been attacked by rot, corm will develop rapidly and plant will mature when four or five months old. Diseased plants have short petioles, crinkled leaves, with a sickly, yellowish, spotted appearance.

Lesson Five—Harvesting.—Harvesters trample around roots of the taro to separate it from the soil. Pulled by hand, and brought to banks. Leaves and corms cut off, leaving huli. Huli left in piles for planting. Corms carried away, and sold or made into poi. If taro is to be marketed as a vegetable, leaves are left uncut. Taro then tied by the tops into bunches.

Poi Manufacture. Imu made by digging large hole in ground; lined with large stones. Large stones placed on bottom, wood placed on them, small stones on top of wood. Wood is burned, heating small stones red-hot. Large stones taken out and small stones fall to bottom. Ti leaves placed on stones, then taro corms are piled on this, and covered with more ti leaves. An upright post or stick put in to preserve hole at center. Top of imu covered with dirt, etc. Post removed and water poured down the central hole, which is then closed. The heated stones turn the water into steam, which cooks the taro. Taro is cooked for seven hours. Instead of cooking in imu, taro is now generally boiled in large, rudely constructed metal containers. When cooking is finished, the skins are removed from corms. They are put into long, boat-shaped poi board and beaten with stone poi-pounder. When taro has been pounded until soft like dough, it is called paiai. This is pounded, water being added meanwhile, until it becomes smooth and fine. Now called poi. Put into small barrels and stored or sold. Is usually allowed to ferment slightly before it is eaten. If it is thin it is called two-finger poi; if thick, one-finger poi. Sometimes poi is made by machinery. Boiled, peeled by hand, put through machine similar to large meat chopper, a small quantity of water being added, as necessary. Some taro goes to the mainland and is made into taroena.

Lesson Six—Economic Value.—A staple food of many primitive peoples, because of its easy culture and great food value. Used extensively by the Polynesians, Hindus, and Orientals. All parts of the plant are useful—leaves and flowers cooked and eaten as greens; old leaves used as fertilizer in taro patches or cooked and fed to swine; corm may be cooked and eaten like potato. Taro is wholesome, nourishing, and very easy of digestion. Taro cultivation, as practiced by the Chinese, is very profitable.

For further information concerning nature-study in the public schools, see "Agricultural Education, including Nature-Study

and School Gardens," by James Ralph Jewell, Bulletin 368, Bureau of Education, Washington, 1908. Also, "The Place and Practice of Nature-Study in the Elementary School," by O. W. Caldwell, Proc. N. E. A., 1909, pp. 471-473.

Before dismissing this cursory statement of nature-study, we may review some of its fundamental axioms. The keynote is sympathy with the world in nature. Keep the child an investigator. Stimulate *personal* investigation. Make the child's interest predominate, it is his world, not the textbook's. Cultivate the spirit of comradeship, shrink not from saying, "I do not know," when occasion demands. Make such occasions stimuli for personal observations. Do not attempt to "explain" everything—all the wisdom of the ages can not explain a single blade of grass. Cling to simplicity of method, and uniformity of atmosphere. Nature-study cannot be reduced to formal plans and schedules.

The Utility of Plant Materials.—There is such a wealth of plant material in Hawaii, as has already been indicated, that its practical utility in nature-study work is obvious. Not only is a great variety readily secured, but our sub-tropic conditions facilitate the study thereof.

Plants may be studied in three different modes—1. By going afield and studying them in their natural environments. This involves the planning of trips and excursions. 2. Collecting specimens, and using these in the class-room as illustrative material. In this manner interesting collections may be accumulated. 3. Planting, in the school grounds, all the plants studied that are adapted to such conditions. The grounds may be beautified thereby, and a living botanic museum is established, which may be drawn upon at any time for requisite material. School gardens are useful in this capacity. A skillful teacher will make use of all three of these modes inasmuch as they mutually supplement one another.

(Conclusion next number.)

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Kon, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugh, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

EDW. M. EHRENHOEN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. VIII.

MAY, 1911.

No. 5.

The palm weevil is attacking sugar cane in Trinidad.

An article in the *Agricultural News* (W. I.) on the fungus causing pineapple disease quotes Cobb and L. D. Larsen, the latter from a bulletin of the Hawaiian Sugar Planters' Association, upon the pest as affecting sugar cane and pineapples in these islands.

This number of *The Forester* contains the conclusion of the valuable series of articles on "Soil Amelioration," by Mr. Hagens, and that of Professor MacCaughy's paper on "The Use of Plant Materials in Nature Study Teaching," which ought to be of great service to school teachers.

The *Tropical Agriculturist* of Ceylon is reprinting from this magazine the article of Mr. F. G. Krauss on rice and cotton investigations in China and Japan, also the study of the composition of the rice plant by W. P. Kelley and Alice R. Thompson from a bulletin of the Hawaii Experiment Station.

At a meeting of the general purposes committee of the International Rubber Exhibition, to open in London on June 24 and close on July 14, the president, Sir Henry A. Blake, G. C. M. G., gave a statement of countries that he had been informed were exhibiting officially, among them being the Hawaiian Islands.

"Forest Nurseries for Schools" is the title of Farmers' Bulletin No. 423 of the U. S. Department of Agriculture. It is by Walter M. Moore, first assistant, and Edwin R. Jackson, expert, of the Forest Service. Circular No. 99, from the office of Experiment Stations, is entitled "Farmers' Institutes for Young People," the authors being John Hamilton and J. M. Stedman, specialist and assistant specialist respectively. Both of these treatises would undoubtedly be useful in all schools where agriculture and forestry are in anywise taught.

In its March number the *Philippine Agricultural Review* gives, from the census reports, a synopsis of the development of the sugar industry in Hawaii, translating values into Philippine terms.

An exchange quotes the *Straits Bulletin* as containing an article by Dr. Boon Keng recommending pineapples as a good catch-crop between Hevea rubber trees, if widely planted. With the trees set 30 by 15 feet apart, "the pineapples should be planted three feet away from each rubber plant, and the lines should be arranged on hill slopes that they serve as terraces to prevent too much wash from rain water. In this way we can get in, say, about 2000 pineapple plants in an acre."

In a collection of banana planting news, *Tropical Life* for April states that, from the results now published regarding the industry in Trinidad, W. I., "it appears probable that a profit of \$200 per acre may be expected from the intensive cultivation of bananas under the present conditions and prices if an adequate dressing of pen manure is available at a reasonable cost. The cheapest method of obtaining pen manure is from pens on the cultivation, and with a supply of green fodder within reasonable distances a small profit on the stock might also be expected."

Noel Deerr is author of a new book entitled *Cane Sugar*, which a review in the *Agricultural News* (W. I.) says "virtually forms a new and extended edition of the author's well-known text-book *Sugar and the Sugar Cane*." Mentioning various matters treated in one chapter, the review says that irrigation "naturally occupies a fairly prominent position in view of the author's experience in Hawaii." Fault is found with the handling of rotation, in that "there is very scant reference to its bearing on the control of insect and fungus pests." Norman Rodger, Altrincham, is the publisher.

Mr. James is welcomed as a contributor to *The Forester's* pages of practical information. His article on the effect of fertilizers on the growth of pineapples can scarcely fail to prove of highest value to the pineapple industry. It is based upon experiment on a considerably large scale. A series of articles on the same subject, it may be mentioned, is running in the *Tropical Agriculturist* of Ceylon, the leading topic of the portion given in March being "the effect of fertilizers upon the quality of the fruit." A. W. Blair and R. N. Wilson are the authors, and their plotting of the ground appears to be much like that of Mr. James. Blood, which Mr. James dismisses on account of its being practically unavailable, enters into nearly all of the fertilizers tested by the Ceylon experimenters.

BOOK REVIEW.

"Notes on Soil and Plant Sanitation on Cacao and Rubber Estates," is the title of a book lately received from London. Its author is Mr. Harold Hamel Smith, who has written other books and is editor of *Tropical Life*, one of our most valued exchanges. There is an introduction by Professor Wyndham Dunstan, Director of the Imperial Institute, who wisely suggests that, since agriculture is a profession, tropical agriculture must be taught by trained professors at a college situated in the tropics. This suggestion may fairly be treasured by the authorities of this Territory, as the nucleus of a vision of the College of Hawaii becoming a world university of tropical agriculture. As a matter of fact, methods of doing things in Hawaii are quoted by periodicals devoted to tropical agriculture in every quarter of the globe, and the very book here under brief review contains much of reference to rubber experiments in Hawaii.

Including the index the book contains 632 pages, besides fifty-two pages of prefatory matter. The author pleads the necessity of treating plant diseases the same as maladies affecting human beings, with regard both to prevention and eradication. A score or more of authorities are quoted, including our own Messrs. Jared G. Smith and E. V. Wilcox, in confirmation of the views advanced and elucidation of cultural methods presented. Among many illustrations in the book two are from Hawaiian photographs. Horner's deep tillage implement and Horner's cultivator, used on Hawaiian sugar plantations, are mentioned as having been recommended for rubber and cacao plantations by Mr. Frank Evans, attached to the Trinidad agricultural department, but temporarily engaged by the Hawaiian Sugar Planters' Association. "Why Hawaii Suits Ceara" is the leading topic of Part V of the book.

There is valuable information in the volume, supported by leading authorities, on the advantages of forest and isolation belts, or of stump pulling, the evils of deforestation, and the serious losses occasioned by soil erosion, reduced or uncertain rain-falls, etc., and how they can be avoided or partially remedied. Several emphatic pages are devoted to rat extermination. It is stated that the present epidemic of plague in India, from its appearance in 1896 up to April last year, had caused 5,250,000 deaths. Plague is universally conceded to be disseminated chiefly by rats.

John Bale, Sons & Danielson, Ltd., medical publishers, Oxford House, 83-91 Great Titchfield street, London, W., are publishers of the book, whose price is \$2 net.

THE CEARA RUBBER TREE.

Nahiku, Maui, May 4, 1911.

Editor Forester and Agriculturist:—I beg to enclose herewith an extract from a very interesting article on the Ceara rubber tree, which has been found to be the tree best suited to our local conditions, for cultivation.

The prejudice against this tree for plantation purposes is being gradually removed, and it occurs to me that this article may prove of interest to your readers, both as indicating the position of a recognized authority, and as tending to show that the Ceara tree appears to have found the Hawaiian climate peculiarly favorable for latex production.

Very truly yours,

W. A. ANDERSON.

Extract from Paper by William Wicherley, F.R.H.S., in the Rubber World for Dec. 29, 1910, on the Ceara Rubber Tree (Manihot Glaziovii).

"The *Manihot Glaziovii*, which produces the Ceara rubber of commerce, enjoys a much wider sovereignty as plantation rubber than does the *Hevea* or *Para* rubber tree, and it is therefore astonishing to find existing throughout the whole of the Mid-East a grounded prejudice against this valuable and exceedingly profitable tree. . . .

"After making careful inquiries in other districts, I found that the real cause why these trees had been condemned was that the planter, after having got his tree to maturity, did not know what to do with it; and there appeared to be nobody who could assist him in the matter. The areas of Ceara rubber that would be priceless now as producing lands had been sacrificed to this want of knowledge.

"On my own observation I should say that the tree, which was introduced into Ceylon by the botanist Cross, was from seed obtained in the Rio de Janeiro district, with the result that most of the Ceara in Ceylon is of a hybrid character, and therefore the true *Manihot* is only met with in a few isolated districts. It is, nevertheless, a very good tree, and, if properly handled, will *always be more profitable to the planter than any other kind of rubber tree that can grow*, provided that the district and the rainfall are suitable."

The paper goes on to describe proper conditions and methods of cultivation and management:

"The greatest difficulty associated with the

tapping of this tree; yet throughout both Ceylon and Southern India planters unanimously agree that this difficulty does exist."

He then describes at length the proper method of tapping, which is now being tried at Nahiku, and concludes:

"In many cases, alienated Manihots assimilate habits of marked eccentricity, due doubtless to local climatic conditions and environment, against which it is powerless to struggle in a proud attempt to assert its own inherited characteristics. This is very marked in regard to the behavior of the latex, which is generally thick and sluggish of movement, and therefore extremely difficult to manipulate except in the form of 'scrap' or naturally coagulated 'ball' rubber. In Ceylon, however, and also to a large extent in India, Hawaii and the Philippines, the Ceara tree yields a latex as fluid and as ready as that of Hevea, with the result that a very fine, translucent, elastic, resilient, amber colored 'biscuit' is being produced, and is being much sought after by tire manufacturers all over the world."

SOIL AMELIORATION.

BY J. F. C. HAGENS.

III.

(Concluded.)

Correction of unfavorable conditions due to the natural location.

TERRACING.

In a hilly country it is frequently observed that while the hill-tops and slopes produce but scant crops, the hollows show a very much better growth. This is due not only to displacement of the fertile clay and silt of the surface soil by rain and other natural causes, but also to a certain degree to human influence in the course of cultivation. After a heavy rain storm in these islands, the sea is often colored for a considerable distance beyond the mouths of the mountain streams. This is caused by the fine soil particles, consisting mostly of the valuable clay, carried away by the rain, and always means a heavy loss to the landowner. It is, as a rule, exceedingly difficult to stay this natural denuding of the soils, particularly with steep slopes, yet there are often ways by which much of the valuable soil, so washed away, could be preserved to agriculture. As a matter of fact the greater portion of soil particles, especially the so-called silt, carried away by the water, will precipitate wherever the rapid flow of the water is arrested. The formation of large banks of detritus at the mouth of large rivers on the mainland proves this sufficiently. A great

deal of valuable soil, that would otherwise be washed away every year, can be retained by terracing the hillsides and heavy slopes. Were it not for such terracing the grape vine would not grow in many parts of Europe today. It is not always possible to carry out these principles, but where stones and wood are available in sufficient quantities a great deal can be accomplished to save the land from gradual impoverishment. Stone walls or fascines built at certain intervals across the slopes or hollows will tend to arrest the rapid flow of the water during a rain storm and cause the precipitation of much of the soil particles carried along by the water.

WINDBREAKS.

Soils of a sandy or dusty nature are often carried away by strong winds during a dry season. It is extremely difficult to prevent this but often the planting of suitable trees in rows at regular intervals has been found very beneficial.

Improving the mechanical and physical condition of soils.

LIMING.

Usually all soils contain sufficient lime to serve as plantfood for any number of crops, although the form in which the lime is present may not be suitable for certain plants. Lime is, however, frequently used to correct unfavorable mechanical, physical or chemical condition of soils. The reasons for the use of lime on soils are manifold and consequently it is important to know which form of lime to use in order to produce the best results under the prevailing circumstances. It depends entirely upon the soil to be treated, and the object of the treatment. It is easy enough for a chemist to say, "Your soil needs lime, you should apply, say, 1000 lbs. of burnt or slaked lime per acre and you will see a great improvement." Very often this improvement fails to materialize, and it is not seldom that reverse results are produced or the results will only show after several years. The fact of the matter is it is extremely difficult to determine, from a chemical analysis alone, in what form the lime should be applied to a given soil; many other circumstances have to be taken into consideration. There is usually no other course to pursue than a practical experiment in the field.

The forms in which lime is usually applied are as follows:

Quicklime, powdered, slaked or hydrated.

Carbonate of Lime.

Sulphate of Lime (gypsum or land plaster).

Phosphate of Lime (as mono-, di-and-tricalcium phosphate).

Each of these has its special advantage and disadvantage, and under certain conditions will do better than any of the others.

MANURING.

The use of stable manure, organic waste products as also concentrated organic manures is not alone beneficial from a standpoint of increasing the fertility of a soil, but it also improves its mechanical and physical condition, to say nothing of the valuable services rendered through the presence of favorable bacteria usually found in these products. The waterholding power, the permeability and the temperature of the soil are favorably affected by these organic manures. Soils are often dead or sterile owing to the lack of humus, although a chemical analysis may show the presence of sufficient plant food for any number of crops. A suitable treatment with organic manure will render these fertile. When mixed with chemical fertilizers organic manures are sterilized more or less, whereby their favorable bacterial action on the soil is practically destroyed. Wherever possible they should be used alone, therefore.

CORRECTION OF ACIDITY OR ALKALINITY.

Good arable soils should be neutral in their chemical reaction, or nearly so, to be fertile; a more or less pronounced acidity or alkalinity is harmful to plant-life. To correct such unfavorable conditions the underlying causes must first of all be ascertained before deciding on the proper remedy. Most acids, with perhaps the exception of carbonic acid, are injurious to plant-life. Lime in one form or other is the usual antidote against soil acidity; others are wood ashes, carbonate of potash, etc. Neutralizing an alkaline soil depends chiefly on the nature of the alkali present. Superphosphate is often a good remedy, but frequently special treatment with acid material is necessary to overcome the causes of sterility.

GENERAL.

The inoculation of soils with nitrifying bacteria is of great value in the improvement of soils, likewise the use of carbon bisulfide.

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Curiously enough while dilatory experiments have been made in Hawaii from time to time, results were either not obtained or else were not deemed worthy of publication, for local literature upon the subject is decidedly meagre. It should be mentioned, however, that experiments have been started by the Hawaii Agricultural Experiment Station, the results of which have not yet been published.

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HISTORICAL.

The pineapple industry is comparatively young in Hawaii, but has grown rapidly and is well established. Naturally the first work was the exploration of the possibilities of the industry, then the exploitation and financing, and finally we find a tendency toward conservation and thrift. Not until about three years ago was a determined and systematic search made for an effective pineapple fertilizer, and the attention of the growers attracted to the fact that such a material was becoming necessary. Previous to this time the pineapple soils had been analyzed by various chemists¹ and phosphoric acid recommended. This was applied in about all the various forms, mainly as basic slag, with more or less uncertain success. Steamed bonemeal and reverted superphosphate were said to have given equally good results. A few haphazard tests were initiated by different people but were never carried to completion.

During the year 1907 and spring of 1908 material was gathered, conditions observed, and plans made for the experiments reported in the paper. The piece of land selected was cheerfully placed at the writer's disposal, by Messrs. Ginaca Bros. It was plowed, harrowed and put into condition to receive the plants which were set June 15, 1908.

OBJECT.

The experiment had for its object the determination of the fertilizer best suited to the particular requirements of the pineapple, the effect of phosphoric acid, nitrogen and potash in their different forms upon the life and growth of the plant, and approximately the quantity necessary for its proper nourishment. We were also desirous of determining if the experience gained in other

¹ Annual Reports, Hawaii Agr. Exp. Sta. 1904-1907-1909.

SOIL ANALYSIS.

MECHANICAL ANALYSIS.

	Diam. in m.m.	Waimea		Florida Exp. Sta. ¹		Australian ²		Jamaica ³	
		Soil	Sub-soil	Soil	Sub-soil	Soil	Sub-soil	Soil	Sub-soil
		%	%	%	%	%	%	%	%
Rock and gravel.....	2.0 —1.0	0.43	0.32	1.66	2.24	2.8	2.74	2.74	2.74
Coarse sand	1.0 —0.5	0.66	0.71	28.78	29.32	14.6	4.05	4.05	4.05
Fine sand	5.5 —0.1	0.95	0.89	43.30	43.16	32.2	30.62	30.62	30.62
Very fine sand.....	0.1 —.05	1.16	0.83	22.92	22.92	5.4	.....	.....	.....
Silt .....	.05—.02	46.53	48.65	0.74	1.12	9.6	55.59	55.59	55.59
Very fine silt.....	.02—.01	.....	.....	0.00	0.04	3.4	0.81	0.81	0.81
Clay .....	.....	34.43	36.80	0.26	0.36	23.5	0.83	0.83	0.83
Organic .....	.....	15.84	11.80	1.38	0.20	....	25.34	25.34	25.34

CHEMICAL ANALYSIS.

	%	%	%	%	%	%	%	%	%
Insoluble matter	40.800	42.400	99.370	99.567	79.750	18.17	79.750	18.17	18.17
Soluble silica	3.680	5.270	0.013	0.016	0.410	.....	0.410	.....	.....
Potash	0.515	0.470	0.006	0.005	0.079	0.17	0.079	0.17	0.17
Soda	0.840	0.450	.....	.....	0.090	.....	0.090	.....	.....
Lime	0.392	0.510	0.008	0.000	0.110	0.25	0.110	0.25	0.25
Magnesia	0.224	0.253	0.006	0.005	0.150	.....	0.150	.....	.....
Ferric oxide and alumina.....	37.220	38.338	0.017	0.177	12.360	.....	12.360	.....	.....
Phosphorus pentoxide	0.165	0.362	0.008	0.006	0.081	0.39	0.081	0.39	0.39
Carbon dioxide .....	.....	.....	.....	.....	0.048	.....	0.048	.....	.....
Volatile	15.820	11.800	0.420	0.248	.....	25.34	.....	25.34	25.34
Manganese oxide	0.450	0.570	.....	.....	.....	.....	.....	.....	.....
Nitrogen	0.324	0.122	0.010	0.005	0.084	0.13	0.084	0.13	0.13
Hygroscopic moisture (air dry).....	10.770	16.750	.....	.....	{ 2.030	5.66	{ 2.030	5.66	5.66

¹ Bulletin 83, Florida Agricultural Experiment Station, 1906.

² Report Department of Agriculture and Stock, Queensland, 1906-1907.

³ Report Board of Agriculture, 1902.

It will be seen by comparison that the soil differs greatly from either that of Florida or Australia. It is a heavy clay, very sticky when wet, and forms in a shotty condition when dry, due probably to the flocculation of the clay. From a chemical standpoint it contains many times more plant food than either of the above mentioned soils. Nevertheless it has been noticed that the pines on these soils respond readily to the action of certain fertilizers, which might indicate that in spite of the quantity of plant food present it is not sufficiently available for the needs of the plants.

In order to ascertain in what proportion the mineral constituents were removed from the soil, ash analyses were made of the pineapple plant and fruit. Following are the results:

	Plants	Fruit
Phosphoric acid .....	.07%	.018%
Nitrogen	1.380	.073
Potash . . . . .	.656	.263
Lime . . . . .	.124	.034

Other investigators found the following percentage of plant nourishment in the pineapple fruit:

	A ¹	B ²
Phosphoric acid .....	.0423	.040
Nitrogen . . . . .	.0707	.110
Potash . . . . .	.2256	.342

These results correspond as closely as might be expected and tend to show that the per cent. of phosphoric acid, nitrogen and potash removed does not vary considerably. Tolman and Munson³ found that the ash of pineapples did not vary appreciably, even with different varieties.

While proper conclusions as to fertilizer requirements can not be based upon the proportion of the mineral matter in the fruit with any degree of accuracy, yet a knowledge of their proportion allows an estimate to be made of the amount of plant food removed by the crop. Considering the plant food removed and also the mineral content of the soil, it was decided that an application of seventy-five pounds per acre of ten of phosphoric acid, twenty-five pounds of potash would be amply sufficient to supply the needs of the crop, and this quantity has been found to be sufficient to be applied.

DEFINITION OF EXPERIMENT

1. To determine the value of the fertilizer applied to the soil 12x182

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Diagram Showing Kind and Quantity of Materials Used.

SECTION A	B	C	D
CHECK			
Superphosphate 400	Superphosphate 400	Superphosphate 400	Superphosphate 400
Lime 750	Lime 750	Potassium Chloride 1275	Potassium Chloride 1275
		Sodium Nitrate 485	Sodium Nitrate 485
Bone Meal 300	Bone Meal 300	Bone Meal 300	Bone Meal 300
Lime 750	Lime 750	Potassium Sulphate 150	Potassium Sulphate 150
		Ammonium Sulphate 365	Ammonium Sulphate 365
Reverted Superphos. 375	Reverted Superphos. 375	Reverted Superphos. 375	Reverted Superphos. 375
Lime 750	Lime 750	Potash-Magnesia Sulphate 290	Potash-Magnesia Sulphate 290
		Organic 535	Organic 535
CHECK			
Sodium Nitrate 485	Sodium Nitrate 485	Sodium Nitrate 485	Sodium Nitrate 485
Lime 750	Lime 750	Superphosphate 400	Superphosphate 400
		Potassium Sulphate 150	Potassium Sulphate 150
Ammonium Sulphate 365	Ammonium Sulphate 365	Ammonium Sulphate 365	Ammonium Sulphate 365
Lime 750	Lime 750	Bone Meal 300	Bone Meal 300
		Reverted Superphos. 375	Reverted Superphos. 375
		Potash-Magnesia Sulphate 290	Potash-Magnesia Sulphate 290
Organic 535	Organic 535	Organic 535	Organic 535
Lime 750	Lime 750	Reverted Superphos. 375	Reverted Superphos. 375
		Superphosphate 400	Superphosphate 400
		Potassium Chloride 1275	Potassium Chloride 1275
CHECK			
Potassium Chloride 1275	Potassium Chloride 1275	Potassium Chloride 1275	Potassium Chloride 1275
Lime 750	Lime 750	Sodium Nitrate 485	Sodium Nitrate 485
		Bone Meal 300	Bone Meal 300
		Ammonium Sulphate 365	Ammonium Sulphate 365
Potassium Sulphate 150	Potassium Sulphate 150	Potassium Sulphate 150	Potassium Sulphate 150
Lime 750	Lime 750	Ammonium Sulphate 365	Ammonium Sulphate 365
		Reverted Superphos. 375	Reverted Superphos. 375
		Organic 535	Organic 535
Potash-Magnesia Sulphate 290	Potash-Magnesia Sulphate 290	Potash-Magnesia Sulphate 290	Potash-Magnesia Sulphate 290
Lime 750	Lime 750	Organic 535	Organic 535
		Superphosphate 400	Superphosphate 400
		Sodium Nitrate 485	Sodium Nitrate 485

and each plat divided into four equal sections. It will be seen that each plat included one-twentieth of an acre, and each section one-eightieth of an acre in area. The plants were set in three rows to the plate, four feet between rows and four feet apart in the row. There are a number of different methods of planting in vogue, but as the writer's idea was to test the one most widely in use in Hawaii the above method of planting was decided upon. The plats were set six feet apart so that a space of ten feet intervened between the outer edge of any two plats. This is not common practice, but was used so that under these conditions there was no danger of pineapple roots from one plat penetrating to another and requiring nourishment not intended for them. Plats 1, 5 and 9 were check plats. Numbers 2, 3 and 4 were treated with superphosphate, steamed bonemeal and reverted superphosphate respectively. Plats 6, 7 and 8 had applications of nitrate of soda, sulphate of ammonia and steamed hoofmeal, respectively. The potash plats, 10, 11 and 12, were treated with sulphate of potash, sulphate of potash and sulphates of potash and ammonia, respectively. These ingredients were applied singly

in section A. Section B is the same as the corresponding plats in A, but with the addition of 750 lbs. of lime per acre. Two ingredients were combined in section C. For instance: the different forms of phosphoric acid were applied together with potash. In section D complete fertilizers were added. It will be seen by referring to the diagram that the fertilizing ingredients were applied so as to supply the same amount of phosphoric anhydrid, nitrogen and potash, viz., 75 lbs. per acre, and that only the forms have been changed. For example: plat 2, section 1, has been treated with 5 lbs. of superphosphate, or at the rate of 75 lbs. phosphoric acid per acre, and plat 7, section A, received 6.7 lbs. of hoofmeal, which is also at the rate of 75 lbs. nitrogen per acre. It will also be noticed that in any plat the sections B, C and D were formed from section A by the addition of one or more fertilizer ingredients, always at the rate of 75 lbs. per acre, so that section A has 75 lbs. plant food per acre, section B the same together with lime, section C 150 lbs., and section D 225 lbs. plant food.

It was the writer's opinion that by this method of experimenting very conclusive results could be obtained by a reference to and comparison of the field notes taken during the progress of growth of the plant and the yield as finally weighed. For instance: by referring to the record of plat 7 in toto; plat 3, section D; plat 10, section D; and plat 11, section C, one may obtain a very definite idea of the effect of sulphate of ammonia upon pineapples when used alone and when in combination with other material.

The fertilizer was applied in the furrow about two days before planting and thoroughly mixed with the soil before the plants, young suckers, were set. While the writer did not believe this to be as desirable a method of application as broadcasting, he accepted it as one very much in use and which under existing circumstances was the more convenient. The suckers were all fumigated with hydrocyanic acid gas before planting to kill any scale or mealy bug which might have been present. Only healthy plants were taken and as nearly of a size as it was possible to get them. All the plants in the experiment were set on June 15, 1908.

The fertilizers used were carefully analyzed in the laboratory and the proper amount for each section was weighed into a bag marked and tagged before shipping to the pineapple plantation. It should be mentioned that the reverted phosphoric acid in plat 4 is a material containing 22% total phosphoric acid, about half of which is in the form of di-calcium phosphate, possibly 1% as mono-calcium phosphate, and the balance tri-calcium phosphate. The reason for including this

in the experiment was that it had been used previously as a pineapple fertilizer by a number of growers with moderate success. The bonemeal used was steamed and finely ground. The reasons for considering steamed hoofmeal as a nitrogen carrier were that it is more easily obtainable, blood always being at a premium, and that there has been some prejudice against its use which we hoped to prove unwarranted. The other materials used are from the stock ordinarily carried by fertilizer manufacturers.

CLIMATIC CONDITIONS.

During the growth of the pines the rainfall was moderate, but sufficient, and conditions were very favorable for pineapples. At planting and during the fall of 1908 the precipitation was mostly in the form of showers, which allowed the pines sufficient moisture, but which were never heavy enough to give the ground a good wetting. In March and April, 1909, there were heavy rains, thoroughly moistening the ground and making radical differences in the various plats perceptible. The fall of 1909 was rather dry, but in the spring of 1910 sufficient rain fell to supply a liberal amount of moisture just as the fruit was setting. From forty to fifty inches a year is the average rainfall in this section, as will be seen from the following table showing the precipitation during the growth of the pineapple:

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1908.....	.....	.....	.....	.....	.....	2.74	1.67	2.60	5.00	2.29	1.85	3.46
1909.....	4.31	3.35	12.62	6.18	.....	4.70	5.14	2.00	3.11	3.13	2.35	8.50
1910.....	4.95	1.80	5.26	3.74	5.23	5.47	.....	.....	.....	.....	.....	.....

FIELD NOTES.

During the progress of the experiment field records were kept, indicating the relative conditions of the different plats. These notes in a great many cases were borne out by the results which were later actually found, but in some cases the appearances as recorded were not at all permanent and plats which were termed very good and excellent in appearance did not yield the fruit that might be expected. For example: 3-D and 4-D were considered the best from the first, and from all appearances were destined to give a very heavy yield, but instead of giving extra heavy fruit they matured earlier than the balance of the crop; 4-D produced the most fruit at the first picking, and on July 1, 1910, was practically harvested, while the fruit on many of the other plats was just ripe enough for the first picking.

Six-A never did well and was considered poor, fair and indifferent from the start. There were only nine plants in the

entire field which failed to fruit, and, of these nine, five were in 6-A.

Ten-A was another section in which two plants failed to fruit and which was considered poor. The plants were yellow, and during the colder weather almost ceased growing. The other sections of plat 10 showed similar symptoms, and were not considered even among the average good until the fall of 1909 and the spring of 1910, yet all these sections gave a yield equivalent to over 13 tons per acre. Judging from the field notes, the best plats would be arranged somewhat in this order of superiority: First, 4-D and 3-D, followed by 11-D and 12-D, then 7-C and 8-C, 6-C, 8-A, 12-B, 3-A, and 4-A would be considered fair, and the poor plats were 6-A, 7-A, 10-A and 12-B. Many of the plats did not show sufficiently striking results either way to merit particular attention. In general, the field notes have indicated the good and the poor plats, but it will be seen by reference to the tabulated results that the sections as indicated being the best according to field notes did not show the greatest gain per acre or the largest profit. It may be said, therefore, that too much confidence cannot always be placed in the field notes, although in many cases they actually forecast the final results.

An important point brought out by field notes and observation which could not well be tabulated with the other results was that the fertilized plats came to maturity and fruited approximately from two to four weeks before the check plats had ripened sufficiently to be weighed. While this tendency was noticeable more particularly in 3-D and 4-D, it was more or less general throughout the experiment.

STUDY OF THE CROP.

The pineapples have to be picked as they ripen, and this necessitates painstaking and constant work in the field, as only a small number of pines ripen at the same time. Therefore, in order to get the average results the field must be gone through every day or two, the ripe pines picked, weighed, and recorded under the proper plat and section for a period of about seven weeks. The first regular picking was made on June 22, 1910, and the last August 15, 1910. In weighing the pines all the ripe fruit from one section of a plat were placed in a tared box and weighed together, the date, number of pines and combined net weight recorded. Owing to the premature fruit, difficulty in securing sufficient labor and the fact that the experiment ripened during the busy season, it was practically impossible to weigh every fruit. Nevertheless, at least 90 per cent. of the fruit was weighed in almost every section, and in a number of sections every fruit was counted and weighed. The average fruit from each section was calculated from the results obtained and the yield per acre then determined.

TABULATED RESULTS SHOWING YIELDS, GAINS AND LOSSES PER ACRE.

Plot	Section	Average Pineapple	Yield in tons per acre	Gain in pounds over check plot per acre	Gain in dollars over check plot per acre	Pounds of fertilizer used per acre.	Value of fertilizer in dollars per acre.	Profit per acre due to fertilizer.
1	A-D	.....	10.29	.....	+\$74.25	....	4.50	+\$69.75
	A	.....3.78	13.50	7,425	.....	400	8.25	+72.24
	B	.....4.96	14.27	8,049	+80.49	400*	8.25	+57.63
	C	.....5.24	13.59	6,588	+65.88	527	21.37	+28.72
3	D	.....4.99	12.90	5,009	+50.09	1,012	3.37	+32.56
	A	.....4.70	12.71	3,593	+35.93	300	7.12	+42.97
	B	.....4.67	12.92	5,009	+50.09	300*	7.87	+47.69
	C	.....4.93	13.70	5,554	+55.54	450	21.37	+19.47
4	D	.....5.03	12.96	4,084	+40.84	815	3.75	1.02
	A	.....4.76	11.60	273	+2.73	375	7.50	+11.56
	B	.....4.28	12.47	1,906	+19.06	375*	8.25	+12.99
	C	.....4.58	12.58	2,124	+21.24	665	23.25	+18.59
5	D	.....4.62	13.56	4,184	+41.84	1,200	.....	.....
	A-D	.....4.98	11.52	.....	.....	.....	13.12	-22.38
	A	.....4.23	11.06	926	-9.26	485	16.87	-20.68
	B	.....4.06	11.33	381	-3.81	485*	17.62	-18.16
6	C	.....4.16	11.49	54	..54	885	20.99	+13.86
	D	.....4.22	13.26	3,485	+34.85	935	13.50	-29.84
	A	.....4.87	11.11	1,634	-16.34	365	17.25	7.99
	B	.....4.08	12.39	926	+9.26	365*	16.87	4.44
7	C	.....4.55	12.55	1,243	+12.43	665	21.75	.....
	D	.....4.61	13.23	2,614	+26.14	1,030	.....	.....
	A	.....4.86	.....	.....	.....	.....	.....	.....
	B	.....4.86	.....	.....	.....	.....	.....	.....

TABULATED RESULTS SHOWING YIELDS, GAINS AND LOSSES PER ACRE.—Continued.

Plat	Section	Average Pineapple	Yield in tons per acre	Gain in pounds over check plat per acre	Gain in dollars over check plat per acre	Pounds of fertilizer used per acre.	Value of fertilizer in dollars per acre.	Profit per acre due to fertilizer.
8	A	4.54	12.36	155	+ 1.55	535	15.00	— 14.45
	B	4.40	11.98	507	— 5.07	535*	18.75	— 24.42
	C	4.88	13.29	1,916	+ 19.16	910	18.75	+ .46
	D	4.67	12.71	763	+ 7.63	1,062	23.25	+ 16.62
9	A-D	4.53	12.33	....	....	....	....	....
	A	5.04	13.72	2,777	+ 27.77	127	3.75	+ 24.02
	B	5.13	13.97	3,267	+ 32.67	127*	7.50	+ 25.17
	C	4.82	13.12	1,579	+ 15.79	612	16.87	+ 1.08
11	D	5.29	14.40	4,138	+ 41.38	792	20.62	+ 20.76
	A	5.26	14.32	3,975	+ 39.75	150	4.50	+ 35.25
	B	5.18	14.10	3,539	+ 35.39	150*	8.25	+ 17.35
	C	5.08	13.83	2,995	+ 29.95	515	18.00	+ 11.95
12	D	5.52	15.03	5,391	+ 53.91	1,060	23.25	+ 31.72
	A	5.64	15.35	6,040	+ 60.40	290	4.50	+ 55.94
	B	4.92	13.44	2,232	+ 22.32	290*	8.25	+ 14.07
	C	5.43	14.79	4,900	+ 49.00	825	19.50	+ 29.50
	D	5.40	14.70	4,737	+ 47.37	1,075	22.12	+ 25.25

* Received 750 lbs. of lime in addition.

The check plats gave higher results in the direction from plats 1 to 12, which indicated possible increase of natural fertility in that direction, plat 1 having an average pine of 3.78 lbs. and plat 9 an average pine weighing 4.53 lbs. It would hardly be fair to the first six plats to figure the whole experiment against the average of all the check plats, as they would have an undeserved disadvantage, while the other six plats would be receiving credit they were not entitled to. Also, if the phosphoric acid plats were figured against the first check plat, the nitrogen against the fifth plat, the superphosphate and nitrate of soda plats would have an advantage not shared by the bonemeal and ammonia sulphate. These in turn would have a certain advantage over the reverted phosphate and organic material.

In the case of the potash plats, it was thought at first that a theoretical check plat 13 could be used, against which part of the potash plats might be figured, but upon more careful deliberation it was decided that the better policy would be to confine all results and conclusions to the actual data in hand rather than indulge in theoretical speculation, however conservative it might be. Therefore, in the tabulated results, the gain and loss in the potash plats was figured from check plat No. 9. The other plats were figured against the adjacent check plats with the exception of plats 3 and 7, which have no adjacent check plat. The gain or loss in these two plats was figured against the average of the two nearest check plats.

In computing the commercial value of the fertilizer used, the schedule of trade values issued by the California Agricultural Experiment Station¹ was taken as a basis from which to figure all mixtures. The values given represent in a general way the market in Honolulu, and as all the ingredients used were figured from the same base the results are therefore comparable. The value of agricultural lime was taken as \$10.00 a ton.

The canneries accept pineapples weighing more than three pounds at a general rate of \$20.00 per ton. The pines which do not reach this minimum are either left on the field or disposed of for juice at half price. As all the sections averaged over three pounds, \$20.00 a ton was taken as a value of the pines. The fact that the pineapples averaged three pounds does not necessarily mean that they were all over the three-pound limit, although in the fertilized plats they invariably were. Nevertheless, in the first check plat 11.25 per cent. of the pines gathered weighed less than three pounds. Here is a point which should be considered as a potential advantage of the

¹ Bulletin 207, College of Agriculture, Berkeley, California.

fertilized plats over the unfertilized. There were a large number of pines which were brought over the minimum weight by the application of fertilizer, and their value was therefore actually doubled, besides receiving the regular rate of one cent a pound for all weight over three pounds.

A glance at the tabulated results will show that the greatest yield per acre was 15.35 tons made by 12-A, while the lowest was 10.29 tons from plat 1. The greatest gain over check was 8049 pounds, obtained from 2-B, and the greatest loss recorded was 1634 pounds from 7-A. From a commercial standpoint the greatest profit from a fertilized plat was \$72.24 per acre from 2-B, and the greatest financial loss was \$29.84 per acre from 7-A, which was also the section showing the greatest agricultural loss. With the exception of plats 10 and 11, the greatest gain per acre and the greatest profit happened to be derived from the same section. Although this need not necessarily be true, it appears from the results to be so in a general way, with the present prices of pineapples and fertilizer material.

It has been demonstrated that superphosphate gave poor results when applied alone at the rate of eighty pounds of phosphoric pentoxide per acre, but that much better results were obtained with the same material and the addition of 750 pounds of lime per acre. While our results with superphosphate alone do not show poor results, such as were obtained in Florida, the results obtained at the Florida Station with regard to superphosphate and lime are certainly corroborated. Where the lime and superphosphate are applied together, the water soluble phosphoric acid is changed to citrate soluble and water insoluble calcium salts, which probably accounts for the better results obtained from the limed plats.

It has also been shown² that nitrate of soda has given poor results when applied to pines. Our results corroborate this fact and it might be mentioned again that of the nine plants which failed to fruit, six were in plat 6 and five of the six were in section A, which would seem to indicate that nitrate of soda does not affect the growth of the plant unfavorably.

When we take the average of the seven different sections containing a common fertilizing element, we get a figure representing the average pineapple of all the sections containing the common element. In repeating this process with all the different ingredients used, we get a series of interesting fig-

ures, which might indicate the relative agricultural value of each fertilizing ingredient, as follows:

	Average of all plats containing
Superphosphate	4.88
Steamed bonemeal	4.88
Reverted superphosphate	4.81
Nitrate of soda	4.60
Sulphate of ammonia	4.75
Organic	4.92
Chloride of potash	4.94
Sulphate of potash	5.10
Sulphate of potash magnesia	5.27
Check plats	4.19

It would seem from this that the phosphoric acid had about the same effect in all three forms; that organic matter gave the best and nitrate of soda the poorest results of the nitrogen carriers; and that the sulphate of potash was a better form to apply than the chloride.

SUMMARY AND CONCLUSIONS.

Superphosphate, reverted phosphate and steamed bonemeal showed good results when applied to pineapple plants. Superphosphate gave better results when applied together with lime.

Nitrogen is not the dominant element in pineapple fertilizing. Of the three forms studied, nitrate of soda was the least productive of good results. There was not much choice between sulphate of ammonia and steamed hoofmeal as nitrogen carriers.

Of the potash salts, the sulphates of potash magnesia gave the best results, followed by sulphate of potash and chloride of potash, respectively.

Fertilized soil tends to bring the fruit to maturity from two to four weeks earlier than the unfertilized.

In interpreting the results, too much confidence should not be placed in the field notes alone.

The results corroborate those obtained by the Florida Experiment Station in practically every instance.

In conclusion, the writer wishes to give Messrs. Ginaca Bros. proper credit for their faithful and enthusiastic cooperation in this work. Acknowledgment is also due Mr. F. G. Krauss and Mr. S. S. Peck for helpful suggestions and advice.

CARLTON C. JAMES.

Chemical Laboratory,

The Pacific Guano & Fertilizer Co.,
Honolulu, Hawaii.

THE USE OF PLANT MATERIALS IN NATURE-STUDY TEACHING.

By PROFESSOR VAUGHAN MACCAUGHEY, College of Hawaii.

(Concluded.)

Field Studies and Excursions.—Properly planned and conducted, these are of great importance in plant study. Much of their failure in the past has been due to lack of organization, and of keeping the center of interest in the subject in hand. Field trips easily degenerate into purposeless picnics, very amusing to the children, no doubt, but yielding no permanent fruits.

In planning an excursion, the teacher should always make a thorough preliminary reconnaissance and carefully outline the trip step by step. The following plan, which will serve as an example of this, was prepared by Miss May Kluegel, of the Territorial Normal School, for use in Grade II.

EXCURSION—TARO.

Observe things of interest on streets through which we pass.
Name streets.

General observation of a valley typical for taro raising (Pauoa Valley)—shape, narrow at head, wide near mouth; slope of sides, abrupt near head, sloping gradually near mouth; stream, winding from side to side of valley; location of taro patches, near lower course of stream at mouth of valley; character of land used for taro, low and level.

Observation of taro patches near at hand—banks, how built, gates; shape of patches; taro plants, conditions under which they grow, distance apart.

Note.—This excursion may also include observations upon frogs, preparatory to taking up the frog lessons in the classroom, as frogs are abundant in taro patches.

Excursions should be seasonable, coinciding, for example, with the flowering or fruiting period of the plant to be studied. This gives an additional incentive and purposefulness to the trip.

Children should be encouraged at all times to bring to school any interesting plants that they may find. In this manner very valuable local collections can be built up.

Collections.—Small plants, portions of large plants, showing leaves, flowers, etc., and leaves of trees, can be easily pressed between dry newspapers. Cut newspapers into pieces, so that when folded once, a folder is formed which is about fifteen inches long and eleven wide. In these folders the fresh specimens, showing leaves, flowers, etc., are spread, arranging them as neatly as possible. The folders are then piled one on top of another,

with a newspaper between every two folders. A board slightly larger than the folders, for example, 12x16, is placed on top of the pile and weighted by means of heavy pieces of rock. As the plants dry, the pile decreases in height, and the plants are pressed perfectly flat. The newspapers between the folders should be changed every day, for they absorb the moisture from the plants, and if not replaced daily by dry ones they cause the specimens to mold. When the plants are perfectly dry they may be glued to sheets of stiff white paper, using ordinary carpenter's or Le Page's glue. A convenient size of mounting paper is 11x16. Each sheet should contain, in the lower right-hand corner, a label giving the name of the plant, the locality in which it was found, the date of collecting, and the name of the collector. In this manner may be preserved interesting and valuable collections of flowering plants, roadside weeds, garden flowers, and other forms of vegetable life.

Seeds, nuts, fibers, bark, wood specimens, and other dry plant materials may be kept in small bottles, cardboard boxes, or manila envelopes.

Planting in the School Gardens. In Hawaii the schools are, in general, fairly well provided with land space, and there is room for setting out various plants suitable for nature-study work. This planting may be in the school garden, or may be for the additional purpose of enhancing the general beauty of the yard.

School gardens in Hawaii are discussed in another bulletin of the Department of Botany and Horticulture, and that matter needs no repetition here. That such gardens can be successfully conducted by the schools of Hawaii was amply shown by the 1907 contest. In 1907 the Evening Bulletin offered five prizes of twenty-five dollars each as a stimulus to agricultural work in the public schools. Some twenty-five schools, representing pretty fairly the various conditions of soil and climate found in the Territory, entered the contest for these prizes, doing the work and making the necessary reports in the required form. The reports were under the following heads: condition of ground; name of crop grown; methods of cultivation; watering, weeding, etc.; amount of growth made; weather conditions; extermination of pests; and general remarks. The pupils of each competing school reported progress weekly, and at the close of the season a tabulated report of work done and results obtained was rendered. The vegetables grown were selected from the following list: lettuce, onions, cabbage, beets, tomatoes, beans, egg-plants, carrots, cucumbers, turnips, melons, sweet potatoes, parsley, Japanese cabbage, and peppers. The competition was very satisfactory to all concerned. There are now in the Territory very few schools in which no serious attempt is being made to improve and beautify the grounds.

Trees and Shrubs.—These serve not only as material for study but also are of prime importance in the aesthetic development of the school yard. "The primary object of the school is instruction. The work of beautifying the school grounds should also carry with it an element of instruction. The grounds should serve as an object lesson for the residents of the community in which the school is located. They should be laid out on sound principles of landscape gardening, and be so well executed as to induce residents of the vicinity to copy the general idea of the plan, and possibly the detail of the shrubbery groups. The idea of beauty can be emphasized in the proper grouping of trees and shrubs in relation to walks, drives, and vistas, and utility can be subserved by placing the heavy plantings so as to serve as a shield from the wind or sun. Shrubby groups can be arranged so as to separate one portion of the grounds from another and yet not interfere with large open spaces which can be used as playgrounds, etc."

A LIST OF TREES AND SHRUBS SUITABLE FOR HAWAIIAN SCHOOL GROUNDS.

- | | |
|-----------------------------|----------------------------|
| <i>Flowering
Trees.</i> | 1. Golden shower |
| | 2. Pink-and-white shower |
| | 3. Pink Shower |
| | 4. Royal Poinciana |
| | 5. Yellow poinciana |
| | 6. Pride of India |
| | 7. Jacaranda |
| | 8. Plumieria |
| | 9. Monkey-pod |
| <i>Foliage
Trees.</i> | 10. Hau |
| | 11. Algaroba |
| | 12. Mexican almond |
| | 13. Monterey cypress |
| | 14. Kukui |
| | 15. Koa |
| | 16. Hala |
| | 17. Banyan |
| | 18. California pepper tree |
| | 19. Kou |
| | 20. Milo |
| | 21. Araucaria |
| | 22. Lei-seed tree |
| | 23. Traveler's tree |
| <i>Palms.</i> | 24. Cocoanut |
| | 25. Hawaiian palm |
| | 26. Royal palm |
| | 27. Wine palm |

- | | |
|----------------|------------------|
| | 28. Attalea palm |
| | 29. Bottle palm |
| | 30. Sago "palm" |
| <i>Fruit</i> | 31. Avocado |
| <i>Trees.</i> | 32. Fig |
| | 33. Rose apple |
| | 34. Wii |
| | 35. Mammee apple |
| | 36. Tamarind |
| | 37. Papaia |
| | 38. Mango |
| | 39. Breadfruit |
| | 40. Sour-sop |
| | 41. Orange |
| | 42. Lemon |
| | 43. Lime |
| | 44. Loquat |
| <i>Shrubs.</i> | 45. Hibiscus |
| | 46. Croton |
| | 47. Pomegranate |
| | 48. Ti |
| | 49. Coffee |
| | 50. Phyllanthus |
| | 51. Rose |
| | 52. Oleander |
| | 53. Cotton |

- *Flower Beds.*—"The love of a flower in the heart of a child is the highest thing that nature-study can hope to develop."—Hodge.

Well-kept flower-beds should be a part of the nature-study equipment of every school in Hawaii. The care of the flowers should devolve upon the children, but this demands genuine enthusiasm and constant oversight on the part of the teacher. The congested condition of the schools, and the numerous demands upon the time and energy of the teacher usually result in neglected flower gardens.

The following suggestions, excerpted from the directions issued by the Home Gardening Association of Cleveland, Ohio, 1904, are pertinent to Hawaiian conditions:

"Avoid a place where the drippings of the roof will fall on the bed. The best effects are produced by planting all of one variety in one place. Dig the bed at least one foot deep. Mix with the soil some rich earth, well-rotted manure, or leaf-mold. Rake the beds well until the soil is fine and free from lumps. Do not plant seeds too deeply. This is a common error. Sprinkle the beds as often as is necessary to prevent the soil from becoming dry. It is best to water beds in

the morning and evening. Avoid having plants too crowded. Thin the plants when they are two or three inches high, during the cooler portion of the day. Transplant seedlings pulled up to another bed, taking up a little soil with each plant. Pick flowers every day, and more will bloom. Allow a few of the best flowers to go to seed for next season's garden. Keep beautiful, fresh flowers in the school-rooms."

Window Boxes.—"Because of the conditions which prevail in a school-room, window boxes must be comparatively deep and must contain a larger quantity of soil than is commonly necessary for the growth of plants in greenhouses in order that the adverse conditions may in part be counteracted. Boxes intended for window gardens should therefore be made at least six to eight inches in depth, should be rather broad, and of a length to conform to the window opening. The soil should be rich garden loam or a compost consisting of rotted sods and stable manure thoroughly mixed together and screened through a screen with at least a half-inch mesh. Before filling the box a layer of coarse gravel should be placed over the bottom to the depth of one inch. Holes should be provided in the bottom of the box, in order that any excess of moisture which comes from watering the plants may escape from the bottom. After placing this drainage material in the bottom of the box, fill it to within one inch of the top with the soil above described. In general, the plants grown in a window box should be small and compact in habit of growth, or those which can be readily trained on strings.

Outdoor Aquaria.—These are very useful in nature-study work, for both the study of aquatic plants and animals. When once established, but little attention is necessary. A stone tank lined with cement is the most durable, but an old wash-tub, sake-tub, or a barrel sawn in half, is quite satisfactory. Sink the vessel in the ground in some unused portion of the school-yard, with the rim projecting out an inch or two above the surface. Cover the bottom with two inches of clean coral or fresh-water sand that has been washed until free from dirt. Stock the aquarium with pond weed, duckweed, water hyacinth, etc. Be sure to put in a number of top-minnows or small gold-fish, to devour the mosquito larvae. Keep the water at a constant level by adding enough to counterbalance evaporation.

"There certainly will come a day,
As man becomes simple and wise,
When schools will put their books away,
Till they train the hands and the eyes;
Then the school from its heart will say
In love of the winds and the skies:

I teach
 The earth and soil,
 To them that toil,
 The hill and fen
 To common men
 That live just here;

The plants that grow,
 The winds that blow,
 The streams that run
 In rain and sun
 Throughout the year."

—Bailey.

BOARD OF AGRICULTURE AND FORESTRY.

Minutes of the meeting of the Board of Commissioners of Agriculture and Forestry, held in the library of Government Nursery on King street, Monday, March 20, 1911, at 2 o'clock p. m.

Present: Marston Campbell, President and Executive Officer; Messrs. P. R. Isenberg, H. M. von Holt and Albert Waterhouse, members; E. M. Ehrhorn, Superintendent of Entomology; R. S. Hosmer, Superintendent of Forestry, and Dr. V. A. Norgaard, Superintendent of Animal Industry.

The Forest Nurseryman submitted routine reports for the months of December, 1910, and January and February, 1911. These were ordered approved and placed on file.

ENTOMOLOGY.

The Superintendent of Entomology submitted his routine report for the month of February, which was ordered approved and placed on file.

Importation of Birds.—The President read a letter of the Superintendent of Entomology to Mr. W. S. Wise of Hilo, President of the Keaukaha Rod and Gun Club, in reply to his of February 6, in regard to the advisability of the importation of fish, oysters and birds.

Cotton Boll Worm.—A communication was read from Messrs. Gay & Robinson in regard to the profitable industry of cotton growing in the Hawaiian Islands if some effective parasite can be introduced eliminating the great damage done to the crop by the boll worm.

In compliance with a previous request from President Campbell, the Entomologist had prepared a report regarding the cotton boll worm (*Gelechia gossyfiella*, Saund.), dated March 13, 1911, for consideration at this meeting, which was

read and approved, and Mr. Ehrhorn was requested to prepare a letter to Messrs. Gay & Robinson, for the President's signature, in reply to theirs of February 27, transmitting copy of this report in answer to their inquiry.

Mr. Ehrhorn stated that the Committee on Agriculture of the House of Representatives had taken a great interest in the matter of an appropriation to be used for the procuring of parasites not only of the cotton boll worm but other pests which are doing damage to various crops, and that he has prepared an outline of what we need here for the legislative committee.

Fumigatory.—Mr. Ehrhorn stated that he was badly in need of a room on the Hackfeld dock in conjunction with the fumigatory thereon. He suggested partitioning off one corner of the dock for that purpose, and asked if he might go ahead with such preparations. Mr. Campbell said lumber was exceedingly high at present, but to go ahead and obtain figures and the matter would receive further consideration.

AGRICULTURE.

Pure Seed.—The President read a joint report, dated March 10, 1911, by E. M. Ehrhorn, Superintendent of Entomology, and Ralph S. Hosmer, Superintendent of Forestry, they having been instructed at a previous meeting to act as a committee to formulate recommendations as to pure seed legislation for Hawaii. These recommendations were ordered approved and placed on file.

New Building Site.—With regard to the Cleghorn Park being taken over for agricultural purposes, Mr. Campbell stated that this was a matter which ought not to be lost sight of. The Board has both plenty of labor and money with which to care for the park.

Mr. Ehrhorn stated that as these old buildings are badly in need of repairs, the Board ought to have the place, "for it is often impossible to do any scientific work in the present laboratory on account of the constant pouring in of dust when making microscopic examinations, and again it is impossible to collect one's thoughts owing to continuous singing and playing at the school next door.

"If we should be able to obtain the Ainahau place, we would have the grandest opportunities for carrying on interesting experiments, not only on injurious pests, but we shall also have the finest facilities for propagating beneficial insects and parasites, and if we are to proceed in doing such work with the appropriations asked for we shall surely have to have better facilities than we have at present for carrying on the work, and in my opinion Ainahau offers just such opportunities."

Mr. Campbell said that he had been called before the Public Lands and Improvement Committee on this proposition and the question of accepting the gift was talked over at some length. If this is taken over by the Territory, the department without doubt will be worked up so that anybody in the islands may well be proud of the place.

ANIMAL INDUSTRY.

A report of the work accomplished to date by the Territorial Veterinarian, dated March 17, was read by title, and ordered approved and placed on file.

Dr. Norgaard said that beef must be imported either from the States or from the Colonies in order to provide for the many soldiers that are being stationed here. C. Q. Yee Hop wants to make one trial importation of beef on the hoof.

Dr. Norgaard further stated that it has become more and more evident that this Territory will not be able to supply its own beef, and that sooner or later the resolution he submitted must be made a standing rule, as all of the States which have regulations requiring the tuberculin test of milking and breeding stock have a clause providing for the admission of cattle for immediate slaughter without the tuberculin test. He read the following resolution in regard to the importation of beef cattle without the tuberculin test, which is to have the same effect as a rule:

"Resolved, That cattle intended for immediate slaughter shall be admitted to the Territory when accompanied by a certificate of inspection, showing that they have been subjected to a careful physical examination and found to be apparently free from disease, or disease-producing parasites (Texas fever ticks). And the said examination must be made, and certificate issued by the same authorities as required by Rule III of the Rules and Regulations pertaining to the importation of live stock to the Territory of Hawaii, except that no certificate of tuberculin test will be required, but that the inspecting officer be requested to provide each animal with an ear-tag for identification.

"Such animals upon arrival shall be placed in quarantine on premises approved of by the Territorial Veterinarian and in the immediate vicinity of the slaughterhouse, and kept there until slaughtered. The owner or consignee shall notify the Territorial Veterinarian when he intends to butcher such imported cattle and shall keep a careful record of the number of the ear-tags, which, after slaughter, shall be removed together with and attached to one-half of the ear, and turned over to the local meat inspector or to the Territorial Veterinarian, who in turn will issue a receipt and certificate of slaughter."

Carried.

DIVISION OF ENTOMOLOGY.

Honolulu, March 31, 1911.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen:—I respectfully submit, as follows, my report of the work of the Division of Entomology for the month of March.

During this month we boarded 34 vessels and we found fruits, vegetables and plants on 22 of them.

The usual careful inspection was made of all shipments with the following result:

<i>Disposal with principal causes.</i>	<i>Lots</i>	<i>Parcels</i>
Passed as free from pests.....	1281	21,037
Fumigated	17	46
Burned	49	51
Total inspected	1347	21,134

Rice Shipments.—The rice shipments during the month exceeded those of the previous month, 20,745 bags having arrived. These shipments were carefully inspected and found free from weevils and other pests.

Pests Intercepted.—As in the previous month plant shipments continued to arrive and about 4165 plants, trees and shrubs were examined. Having found previous shipments infested with scale insects and other pests I deemed it advisable, on account of the methods used in packing and the packing materials, to subject these shipments to longer fumigation. The results have been very satisfactory and no injury to the shipments has resulted. We are very careful about fumigating plants and never attempt to do it if plants are at all moist from sweating en route, as in such condition fumigation will invariably injure the foliage.

On some oranges in the baggage of a passenger from Fiji we found a new scale insect (*Pinnaspis* sp.). The white peach scale (*Aulacaspis pentagona*) is frequently found on plants from the Orient, and although we have the pest here we always destroy badly infested plants.

Some orange trees from Japan infested with the white fly (*Aleyrodes citri*) were thoroughly fumigated first, then each tree was defoliated and cut back to stumps. This pest only infests the foliage, so that after our vigorous treatment no danger of the pest remained.

All foliage and twigs were burned. We discouraged the further shipments of such plants.

Two species of ants (*Strumigenys lewisi*) and (*Pheidole* sp.) were found on Japanese plants, the first in stems of a tea plant, the latter in soil around bamboo.

Some cocoanuts from Central America were found infested with scale (*Aspidiotus cydoniae*).

Seven lots of sweet potatoes and yams found in the immigration baggage were destroyed on account of showing infected spots, which might prove a disease, although no germs have been found. The risk of bringing in a disease which would attack the sweet potato and the taro is too great and in the future all such shipments will be refused entry.

The first two lots of banana plants consisting of four sprouts from Central America and Mexico were received this month and under Rule VIII were promptly destroyed.

Brother M. Newell, inspector at Hilo, reports the arrival of six vessels, three of which carried vegetable matter consisting of 108 lots and 1778 parcels. One lot of infested cauliflower was burned.

Beneficial Insects.—At the request of Mr. D. Morrison, superintendent at Midway, we sent a good strong colony of vedalia cardinalis for the cottony cushion scale, which attacks their iron-woods. Much complaint of damage by the Japanese beetle is coming to the office and we are prepared to furnish fungus inoculated beetles, but request that parties furnish us quantities of beetles, as we are short handed and cannot get beetles.

Respectfully submitted,

EDW. M. EHRHORN,
Superintendent of Entomology.

Honolulu, April 30, 1911.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen:—I respectfully submit, as follows, my report of the work of the Division of Entomology for the month of April.

During this month we boarded 36 vessels and we found fruit, vegetables and plants on 19 of them.

The usual careful inspection was made of all shipments with the following result:

<i>Disposal with principal causes.</i>	<i>Lots</i>	<i>Parcels</i>
Passed as free from pests.....	597	7,284
Destroyed	29	128
Fumigated	12	23
Total inspected	638	7,435

Rice Shipments.—The rice shipments during the month were about equal of last month, making a total of 20,371 bags, which, after a careful inspection, were found free from weevils or other pests.

Pests Intercepted.—One hundred bags of scabby potatoes were

ordered returned to the Coast. This is the first large infested shipment which has arrived here for a long time, and it was so badly infested that sorting over was out of the question.

Several lots of sweet potatoes were again found in the Oriental baggage, some infested with the potato weevil and some showing disease spots as in previous shipments, and all were promptly destroyed.

In corn seed from the United States we found the grain weevil *Calandria granaria*.

Ornamental plants from Japan infested with scale insects *Pseudaulonidia duplex* and *Aspidiotaspis pentagona*, also plant lice on pine trees, *Lachnus* sp.

In the mail from Florida, palms infested with scale insects and mealy bugs.

Brother M. Newell, inspector at Hilo, reports the arrival of nine vessels, four of which carried vegetable matter consisting of 92 lots and 1117 parcels. The outer leaves of a shipment of cabbage were removed on account of cabbage-leaf fungus.

During the month much complaint continued to come to the office regarding the Japanese beetles and we were able to send out 54 lots of beetle fungus in large quantities. Parties furnishing the beetles were promptly supplied. We are inoculating beetles as fast as we get them.

I also received two large boxes, estimated to contain 50,000 ladybirds (*Hippodamia convergens*) from Mr. E. K. Carnes, superintendent of the State Insectary of the California State Commission of Horticulture. Half of these were liberated in the upper valleys and half in the taro lands, where plant lice were abundant.

Very often the question has been asked "*How do all the pests get into the country?*" In answer to the same I will state that during this month a package of sweet potato seed arrived by mail, marked "merchandise," and passed the postal authorities as well as the Division of Entomology. It was only through the great interest for the welfare of the island shown by Mr. J. B. Castle that we were able to examine this lot of potatoes and subject them to a dip in formaldehyde. He happened to get in touch with the party who received them and before planting them thought that I had better pass upon them. How many such packages go through the mail nobody knows, but it surely goes to show that the chances for introducing pests are not all abandoned as yet. The party, of course, did not send these potatoes as merchandise to get them through without inspection, but probably thought that they would go cheaper through the mail by marking them "merchandise." I only hope that we shall have more citizens come forward like Mr. Castle and notify us if packages containing seeds and plants should happen to pass in under similar conditions.

Respectfully submitted,

EDW. M. EHRHORN,
Superintendent of Entomology.

THE WORLD'S COTTON.

According to Census Bulletin No. 110, giving cotton statistics for the year ending August 31, 1910, the number of active cotton spindles in the world has increased from 105,681,000 in 1900 to 134,526,000 in 1910, or 27.3 per cent. The consumption of cotton per spindle was 70.9 pounds in 1900, compared with 67.2 pounds in 1910. While this decrease has been due in part to the fact that the spindles were operated to a greater percentage of their capacity in 1900 than during the past year, it is probably due more largely to the increasing manufacture of finer goods.

The fluctuations in the world's commercial supply of cotton are measured practically by the variation of the annual production of cotton in the United States, as this country furnishes about two-thirds of the total commercial supply. The consumption of cotton during the year ending August 31, 1910, was 18,321,000 bales of 500 pounds gross weight.

Assuming that the consumption statistics for foreign countries have been returned in net-weight bales, and reducing the American consumption figures to net-weight bales, the world's consumption is estimated at 18,079,000 bales of 500 pounds net.

EXTENT OF COMMERCIAL PRODUCTION OF COTTON.

The world's commercial production of cotton in 1909 amounted to 16,558,000 bales, or 1,521,000 bales less than the consumption for the year ending August 31, 1910. The world's consumption of cotton during the year ending August 31, 1909, amounted to 19,397,000 bales, the capacity of the mills has been increased by about 1,250,000 spindles during 1910. For this reason the potential consumption of the mills of the world at the present time is estimated to be not less than 20,000,000 bales. Furthermore, the stocks of manufactured goods have materially decreased, so that, in 1910, a world crop equal to this consumption requirement of 20,000,000 bales is needed. Of this the United States would be expected to contribute at least 13,500,000 bales in order to keep the mills operating during the year and to prevent further reduction in the already low supply of raw cotton.

In respect to cotton manufactures, the United Kingdom ranks first as an exporting country, and British India as an importing country. Germany ranks second in exports, and is followed by France, Belgium, Switzerland, and British India, in the order named. In respect to the value of cotton goods imported, China ranks next to British India and is followed by Germany and the United States.

In view of the recent development of trade relations between the United States and Central American countries, it may be interesting to note that a report compiled by the Government of Honduras gives the total value of cotton manufactures imported into that country during the year 1907 as about \$700,000, more than one-half of which represents imports from the United States. Out of the twenty American Republics lying south of the United States, there are only three—Honduras, Haiti, and the Dominican Republic—in which the United States leads in the trade in cotton manufactures. Germany controls the trade in these goods with Bolivia, and the United Kingdom that with the remaining sixteen Republics.

STATISTICS FOR LEADING TEXTILE FIBERS.

The relative importance of the leading textile fibers has undergone considerable change during the past century. Flax fiber, which was used to a larger extent in 1800, now ranks fourth, and the quantity of flax produced is only about three times what it was at that time. In the same period the production of wool has increased from about 500,000,000 pounds to nearly 2,700,000,000 pounds, or more than fivefold, and that of cotton from about 300,000,000 pounds to 8,505,000,000 pounds, or more than twenty-eight fold. The increase in the production of jute is the most remarkable of all. The quantity in 1850 was 60,000,000 pounds as compared with 2,918,000,000 pounds in 1909. The increases since 1889 are as follows: Cotton, 44.8 per cent.; wool, 11.4 per cent.; silk, 112 per cent.; flax, 85.9 per cent.; and jute, 56.9 per cent.; while hemp shows a decrease. If the figures for 1908 were taken as the basis of comparison the increase for cotton would be 81.8 per cent.

The total production for 1909 of the leading textile fibers was 17,529,174,000 pounds, of which cotton constituted 48 per cent.; wool, 15.3 per cent.; silk, less than one-half of 1 per cent.; flax, 10.6 per cent.; hemp, 8.2 per cent.; and jute 16.6 per cent. The total supply of these textile fibers in commercial channels at the beginning of the nineteenth century amounted approximately to 1,400,000,000 pounds, of which cotton formed about 22 per cent.; wool, 33 per cent.; silk, 1 per cent.; and flax, 43 per cent.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugh, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications **SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.**

EDW. M. EHRLHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

Vol. VIII.

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No. 6.

Another practical article by Mr. C. C. James relative to soil doctoring is printed in this number.

Mr. McCaughey's sketch of the history, purpose and work of the Territorial Teachers' Association will add to the value for preservation of this number of the Forester.

Governor Frear has appointed Mr. Charles S. Judd, trained in the service of the Federal bureau of forestry, as Commissioner of Public Lands, with which new legislation combines the presidency of the Board of Agriculture and Forestry. Mr. Judd belongs to Honolulu.

Investigation of the question of introducing insectivorous birds to these islands, which readers of this magazine know was instituted some months ago, should by all means be prosecuted without delay to the stage of decision relative to what species of such much needed creatures shall be introduced. The risk of injurious mistakes in the selection can hardly be greater than that of destruction of valuable crops by insects that are fattening for birds upon the vital tissues of our garden and field growths.

Since last issue of the Forester the public has been apprised that the Mediterranean fruit fly has gained a shockingly long march upon the susceptible fruits of the island of Oahu. Unfortunately, there is doubt unremoved at this writing of whether the government has a fund available for fighting the pest in the most efficacious way believed—namely, by means of some parasite that will destroy it but which must be sought in other lands. However, the Cotton Growers' Association is likely to step into the breach by raising \$1500 for adding to a like amount offered by Mr. Joseph P. Cooke for the purpose of paying the expenses of an entomologist to go upon such a quest. In the meantime precautions are being taken to prevent the transit of the fly to any of the other islands, as well as means of combating the pest with pruning knife and fire.

MR. CURRAN'S REPORT.

Attention is called to the short report on the Maui forests by Mr. H. M. Curran, that appears in this issue of the *Forester*. Mr. Curran is one of the senior forest officers in the Philippine Bureau of Forestry. Through the courtesy of the Director of that Bureau, Major George P. Ahern, it was arranged for Mr. Curran to stop over in Hawaii for a month on his return to Manila from a trip around the world, to consult with the staff of the Division of Forestry in regard to certain intricate forest problems on Maui. Mr. Curran's findings and recommendations are given in the report printed elsewhere.

SOUTH KONA FOREST RESERVE.

On another page of this issue of the *Forester* appears Governor Frear's proclamation creating the South Kona Forest Reserve, in the districts of South Kona and Kau, Island of Hawaii. The total area of this reserve is 36,952 acres, of which 29,260 acres belongs to the Territorial Government.

When the South Kona Reserve was first reported on by the Superintendent of Forestry it was recommended that the area to be included within the boundaries be 50,612 acres. At the public hearing, held on January 28, 1911, some opposition developed to the setting apart of a portion of this land, in that it was claimed to be adapted for homesteading. Believing these objections to be well founded Governor Frear directed that a new description be prepared eliminating the lands in question. This having been done, he signed the proclamation on May 17, 1911. The report of the Superintendent of Forestry giving the reasons for the creation of the South Kona Forest Reserve may be found in the *Forester* and *Agriculturist* for February, 1911, Vol. VIII, No. 2, pp. 65-69.

MARKETING OF PRODUCTS.

One of several acts of the last Legislature for the promotion of diversified agriculture from which much benefit is justly expected provides for a market superintendent, who shall arrange for the disposal of Hawaiian products in the mainland markets, as well as in those supplying home demand besides advising and directing producers with regard to the ripening, packing and shipping of the commodities. This is the very service which the *Forester* and *Agriculturist* advocated having attended to, in several articles published six or seven years ago. The only difference was that this magazine then recommended the growers of marketable staples to accomplish the object on their own behalf by coöperation. No doubt self help to this end would in time have been invoked and with success, but it would appear that circumstances

are unfavorable for accomplishment upon the initiative of producers without such delay as would break the spirit of the small farmer of average enterprise. Both by individuals and communities, this class is very much scattered throughout the islands and consequently those having a common shipping route either to any of the local markets or to the ports of exportation are in few cases strong enough in numbers to command things generally for their own advantage.

Almost if not quite from its institution, civilized government in Hawaii has lent its power and prestige to the promotion and development of agriculture, and now under the grand condition of an absolutely free market for all products in the United States, of which this group is an integral part, there should be no exception made with regard to the diversified crops for which there is constant demand at good prices not only on the mainland but in foreign countries, yet which available acreage and congenial soil and climate are only scantily and fitfully yielding because of various obstacles that are well within the power of the little commonwealth to overcome or remove. Chief among the drawbacks to be conquered are the lack of colonization or homestead roads, adequate and efficient water transportation at fair rates and a proper system of marketing of which the promise has instigated these remarks.

Sundry new industries, it is true, have distanced paternalism in the race toward the goal, but these are in the category of production of world market commodities, which, to be profitable, calls for output on a comparatively large scale—such as cotton, rubber, coffee, preserved fruits, etc. Yet even in the case of these, there is large scope for improvement in the matter of facilities for transportation available to some existing plantations, while all three great requisites above mentioned are wanting throughout the islands in such degree as undoubtedly keeps untold expanses of suitable land from immediate tillage. Other legislation of last session bears more or less practically upon the great needs of diversified agriculture besides marketing essentials. Let us hope that there will be no avoidable delay in bringing any of these development measures into complete fruition.

WORK OF THE TERRITORIAL TEACHERS' ASSOCIATION FOR 1910-11.

The Territorial Teachers' Association of Hawaii has a long and creditable record of endeavor. During the many years of its activity it has interested itself in all matters pertaining to the upbuilding of an efficient school system. It has been a potent factor in constantly raising the ideals of service of the teaching profession of Hawaii.

The long continued existence of the body is "a strong indication of the right professional spirit among the teachers," and this

spirit has been especially manifest during the meetings of the past year.

The Association consists of a central organization in Honolulu, with branch organizations upon each of the other islands. Any teacher of the public or private schools is eligible to membership. There are no dues nor fees. The officers consist of a president, vice-president and secretary, elected annually. The officers for 1910-11 were Mr. J. C. Davis, Miss Ida Ziegler, Mr. Vaughan MacCaughy. An advisory council, consisting of the principals of the larger schools, assists in the planning of programs and other executive work of the association. Meetings are held monthly, usually in the auditorium of the McKinley High School.

With regard to the work on the other islands, Miss Josephine Deyo reported, (1909): "On Hawaii, the Hilo Teachers' Union, organized in 1893 and composed of about seventy-five Hilo and Puna teachers, convenes four times a year. The leading features of its meetings are classroom work, general papers, discussions, addresses and exhibitions of pupils' handiwork.

"A second Hilo society, known as the Teachers' Reading Club, has met for eleven years on two evenings of each school month to pursue such lines of work as make for culture and broader scholarship. The present work is on the art, literature and history of Spain.

"The Kohala Teachers' Association, now about seventeen years old, meets quarterly and is a helpful factor in the Kohala educational field. Practical schoolroom work and the presentation of successful methods and devices by capable teachers characterize its meetings."

Once a year all the Maui teachers meet at Wailuku as the "Maui Teachers' Association." The Wailuku-Makawao Association of about fifty members meets once in two months, emphasizes the work of primary grades and pays some attention to the subject of school agriculture.

The Lahaina Association, which meets monthly, was organized September 1908, with thirty members including teachers from all islands. They attend the meetings once in three months. Discussion and exchange of views on topics of vital interest to teachers rather than the reading of formal papers, is favored in this body.

Distance and the difficulties of island travel make it impossible for all the teachers of the Territory to avail themselves of the advantages of association work, but the organizations mentioned above include a large percentage of our teaching force.

National matters have had a prominent place in the legislation of both the nation and the Territory during the past year. Especially, the association has taken a particular interest in the proposed affecting education.

Mr. J. C. Davis, bill, pending the action of Congress, re-

ceived careful consideration at the first two meetings of the year. This well-known bill is in the interests of vocational training, with special reference to agriculture. It augments the extension work now so largely carried on by the agricultural colleges, and provides for the training of teachers to teach vocational subjects. On the whole, the bill is very broad in its provisions and, if it were to become law, it would act as a forceful and widespread stimulus to the teaching of agriculture and related subjects. President Gilmore, of the College of Hawaii, presented this matter at the first meeting of the year, and enlarged upon its benefits to Hawaii before the principals' section of the second meeting. Formal action favoring the measure was taken by the association, the branches upon the other islands were notified, and recommendations were sent to the Territory's representative at Washington.

The work of the School Fund Commission was most heartily commended by the association, and the recommendations of that commission to the Legislature were formally seconded. Mr. Wallace R. Farrington, chairman of the commission, presented a succinct statement of its conclusions with regard to the best educational policy for Hawaii. A brief digest is as follows:

"First, that throughout the American mainland the public school has a recognized prior claim upon the revenues of the country. Second, that the demands of public education are principally met by a specific tax on real property and personal property levied in sufficient amount to meet the requirements of the public schools. Third, the income from the public lands is almost invariably turned over, in a large measure, to the cause of education."

The ability to speak, read and write the English language is of paramount importance, educationally and politically in a land of such cosmopolitan population as is Hawaii. Emphasis is placed upon "establishing the relationship between the thought and the spoken, written or printed symbol for the thought. This relationship is the basis for all of the child's future work.

"In schools where the mother tongue is the tongue of the schoolroom, this relationship is established by the home, and the teacher gives attention principally to drilling the child on the recognition of the written or printed symbols, but where the tongue of the schoolroom is not the language of the home, as in Hawaii, it is necessary to first establish this relationship before giving the needed drill on the symbol. Only in this way can the teacher be sure that the child is learning to talk, write and read the English language."

This work naturally receives special attention in the primary grades. Mrs. Knight, of Kaiulani school, conducted a round table on "Methods of Teaching Primary Reading," which was well attended, and where marked interest was shown.

Of great usefulness as an aid in teaching English, and of high educative value in itself, is the arts and crafts work in the primary

grades—expression through the thing, as well as through the language—symbol. "Art Expression in the Primary Grades," formed the central theme of a presentation by Miss Jessie Shaw. To quote Kirby: "Our public school art education has a peculiar significance as a medium for a liberal education, since it has for its prime aim the training of the senses and the co-ordination of the potential but very discordant faculties of the child * * * efficiency and fitness for life's work are primarily dependent upon the harmonious working of the motor and sensory centers of the human machine."

Athletic sports and pastimes form an important factor in the development of the boy and girl in the upper grades. This statement was fully elucidated by Principal C. T. Pitts, of Punahou Preparatory School, who made a strong plea for the recognition of athletics in the grammar grades, for the coöperation of teachers and principals, and for a thorough systematization of effort. The good work of the Grammar School League of Honolulu is well known. Those who are interested in this subject will find a very helpful article in the Proceedings of the N. E. A. for 1909, by Chadsey, entitled "The Proper Relation of Organized Sports on Public Playgrounds and in Public Schools."

At a sectional meeting Miss Ida Ziegler, of the Normal School, had charge of a section on "Teaching of Arithmetic in Grammar Grades." She dealt with the most effective methods of outlining work, presenting problems, and for developing mathematical independence on the part of the pupil.

Several noteworthy papers dealing with natural science subjects were presented at various meetings. Mr. Bairos, of the Department of Natural Science of the McKinley High School, addressed the association on "The School as Related to Civic Health Problems." He elucidated the numerous relationships between natural science teaching in the public schools and the problems of community health that continually force themselves upon the city. The mosquito campaign and the various prevalent bacterial diseases afforded him timely and graphic illustrations for the main points of his argument.

"Methods of Teaching Geography," were given detailed attention by Miss Ruth Shaw, in charge of that work at the Normal School. She gave special attention to the use of types, that is, the detailed study of typical regions, political divisions, industries, etc., and the use of these in illustrating other similar groups.

Mr. Vaughan MacCaughey, of the College of Hawaii, addressed upon "Natural Science Teaching in the Public Schools." He dwelt especially upon the child's right to a knowledge of the common things of his environment. Natural science teaching no longer needs to excuse itself, it has a legitimate place in the curriculum. The importance of first hand contact with the subject matter through laboratory exercises and field work was stressed.

Principal Edgar Wood, of the Normal School, urged at several meetings the consideration of industrial education, and the association expressed its approval of the following plan for this Territory:

On each of the four islands, Kauai, Oahu, Maui and Hawaii, schools shall be established contiguous to important centers of industry. These schools to give training in agriculture, home economics, trades and industries. This instruction to be given in field, garden, kitchen and shops, and to be of such practical nature as to enable the pupils at the end of the course to take up work in connection with the respective industries at remunerative wages.

The type school for such a system is as follows: A school shall be established in a given locality when twenty-five students can be assured. The attendance of all boys and girls between the ages of 14 and 18, both inclusive, who are not otherwise wisely and profitably employed, shall be required. The equipment of the school shall consist of a farm of not less than 25 acres, to be increased in proportion to the number of boys attending by $2\frac{1}{2}$ acres per boy, and to be equipped with essential hand tools. A shop equipped to meet the needs of the industries of the neighborhood. Residence buildings provided with sanitary and culinary equipment for properly housing and feeding the pupils. Students shall be remunerated for their work in accordance with current value, or profit-sharing. Students shall work the first two years on the farm or in the shops of the school, and the last two years one-half of each day in the fields or shops of the industry of the locality. The rest of each day will be devoted to the study of related academic subjects—mathematics, geography, reading and writing, etc. The Department of Public Instruction will engage and pay all instructors. The industry will supply lands, buildings and equipments, and pay the students working for them in fields, shops, etc. The school shall cultivate the land set apart by the industry, and pay the pupils part of the proceeds of the crop.

Among the very important papers of the year were those relating to the general welfare of the schools. President Horne, of the Kamehameha Schools, delivered a most helpful address on "Increasing the Efficiency of Hawaii's Schools," a lucid exposition of practical attainment of greater powers for service. "Hawaiian Schools and Citizenship," by Dr. Scudder, of Central Union Church, laid fitting emphasis upon the necessity for training our young people toward moral and civic responsibility. Mr. W. A. Bowen, at a special meeting for the consideration of the needs of our schools as related to possible legislative action, spoke forcefully upon "Public Interest and the Schools."

Many other features of the year's work might be dwelt upon, but the above synopsis at least indicates the forward spirit that has ever characterized the actions of the association. There are many defects that will gradually right themselves—greater soli-

clarity of organization, more interest in the out-of-town teachers, systematic publication of addresses and papers—but these are minor flaws in an institution that represents the best interests of our public school system, the crowning glory of the American commonwealth.

VAUGHAN MACCAUGHEY,
Secretary.

The College of Hawaii.

*A THEORY REGARDING THE MANGANESE SOILS
AND PINEAPPLES.*

The manganese soil of Wahiawa presents a peculiar if not unique problem when studied with relation to its effect upon the pineapple. In many cases the pineapple plants upon this soil are stunted in growth, are more susceptible to infection, are sickly in appearance and lack the healthy green color imparted by a normal supply of chlorophyll. While it is admitted that these conditions may be brought about by agents other than manganese such as lack of drainage, root-rot, uric acid and its salts in liquid manures, still it is conceded that in this particular case the manganese is responsible for these unhealthy manifestations. Practically every one who has made an investigation of this problem has drawn some conclusion correlating the unhealthy appearance of the pineapples with the manganese in the soil.

Manganese is found widely distributed in nature, but never in the free state. It is found mostly in combination with oxygen as manganese dioxide (pyrolusite), manganic oxide (braunite), and red manganese oxide (hausmanite). There is also a manganous oxide which with the manganic oxide shows basic characteristics. This fact may account for the results obtained by W. P. Kelley in Press Bulletin 23, Hawaii Experiment Station, showing that the acidity of the manganese soils was less than adjacent fields containing only moderate amounts of manganese. Manganese dioxide is able to give manganous salts with the elimination of available oxygen and it is also capable of combining with more basic oxides such as lime to form unstable compounds known as manganites.

Kelley has found manganese in these soils equivalent to 9.74% mangano-manganic oxide. Analyses made in this laboratory as early as February, 1906, showed the manganese soils to contain manganese equivalent to 7.8% mangano-manganic oxide, 2.1% which was combined in silicate form and the balance as higher oxides.

Mr. O. Tamm, investigating complex manganese compounds of the hydroxy acids found that citric acid dissolved considerable amounts of manganous hydroxide. The oxides of manganese have also been shown to be soluble in acids. H. Molish has shown that certain water plants when placed in solutions of different

organic and inorganic compounds of manganese deposited manganese dioxide in the epidermis of the leaves. Other investigators, particularly in Japan, have shown that manganese salts have a toxic effect upon plants other than pineapples when used in large amounts. It can be said briefly that the manganese oxides and hydroxides which exist in the Wahiawa soils are soluble in hydroxy acids including citric acid which is responsible for the greater part of the acidity of the pineapple; that it is possible for manganese salts to be taken up and deposited in the plant, and that these salts in large amounts would no doubt be toxic to the plant. It is doubtful, however, if manganese dioxide would be deposited in the pineapple as Molish found to be the case with water plants for the reason that the citric acid would immediately act upon it liberating carbon dioxide.

Wherever sugar cane has been planted upon these soils it has given much better results than pineapples. There must be something essentially different in the nature of the two crops with relation to manganese that one should be so markedly affected and the other practically unharmed. Since the mineral matter of the plant is contained in the ash we may expect to find these differences made apparent in the ash. The writer has tabulated below some of the mineral matter taken up by the sugar cane and by the pineapple:

	Pineapple	Sugar Cane
Manganese Mn_3O_4	1.52	.05
Chlorine	8.25	6.07
Lime	7.61	5.78
Potash	40.00	33.08
Phosphoric acid P_2O_5	4.5	8.05

As the ash of the pineapple is at least 1.5% of the plant and the ash of cane is not over .8% it will be seen that the pineapple plant takes up more of these ingredients pound for pound than does the cane. This is true particularly of the manganese, chlorine and lime. The greater solubility of the salts in the pineapple may be due to greater acidity or some other cause, but we have evidence from the ash analysis that more of these elements are taken up by the plant than by the sugar cane. There is considerable manganese present in some soluble form possibly complex and organic, there is considerable chlorine present indicating chlorides of the alkalis and alkaline earths, and there is an abundance of lime. In fact we have in the plant all the necessary elements for the decomposition of hydrochloric acid and the formation of calcium manganites.

Manganese dioxide with lime forms several manganites, $CaO \cdot MnO_2$, $CaO \cdot 2 MnO_2$ and $CaO \cdot 5 MnO_2$. These compounds are very toxic and we may suppose that they could be formed in the plant or in the soil around the roots from manganese chlorides.

calcium chloride and manganese dioxide. As an example a case at Wahiawa may be cited when a heavy dose of burnt lime was applied to the field. After the application of lime the plants practically ceased to grow, turned nearly white in color and had to be taken up.

Ordinarily an application of lime would be considered beneficial but in the case of the manganese soil we find it highly injurious. This action would seem to point to some combination between the lime and manganese with the production of a toxic compound.

We know that manganese oxides are soluble in dilute acid solutions, that manganese is taken up by the plant in comparatively large quantity along with lime and chlorine, that calcium manganite is poisonous to the plant and that we have the necessary materials at hand in or around the plant for its formation. Why then may we not assume, until more data is at hand or a better explanation is forthcoming, that the toxic effects observed upon the pineapples on the manganese soil at Wahiawa is due to the action of calcium manganite primarily, and to the secondary action of other salts and acids upon the calcium manganite?

CARLTON C. JAMES.

Chemical Laboratory, The Pacific Guano & Fertilizer Co.

BOARD OF AGRICULTURE AND FORESTRY.

Meetings of the Board of Commissioners of Agriculture and Forestry were held in Honolulu on April 5 and 27; May 10, 20, 22 and 23, 1911. The more important business taken up at these meetings was as follows:

MEETING OF APRIL 5, 1911.

Forestry.—The following appointments were made: Mr. George O. Cooper, District Forester for Hana, Maui, to succeed Mr. C. J. Austin, resigned. Mr. Alex. C. Dowsett, District Fire Warden in and for the District of Honuaula and Kahikinui, Maui.

Letter of Thanks.—Voted that an official letter of thanks be sent to Sheriff Jarrett and Deputy Sheriff Rose for their assistance at the Manoa Valley forest fire on the night of April 1, 1911.

MEETING OF APRIL 27, 1911.

Routine Reports.—The routine reports of the Forest Nurseryman were submitted, approved and ordered placed on file, as was also the report of the Superintendent of Entomology for the month of March.

MEETING OF MAY 10, 1911.

Forestry.—The routine reports of the Superintendent of Forestry for March and April were submitted. Action on them was deferred until the next meeting.

The question of granting permits to gather awa in the Territorial forest reserves was referred to the Superintendent of Forestry to be reported upon with recommendations.

Use of Water in Forest Reserves.—Mr. Campbell notified the Board that the Attorney General had rendered an opinion, No. 203, dated May 5, 1911, by Mr. A. G. Smith, which ruled that a water license recently issued to the Pupukea Water Users' Association to develop water on and pipe the same from the Pupukea Forest Reserve should have been issued by the Board of Agriculture and Forestry rather than the Superintendent of Public Works and Commissioner of Public Lands. The Board thereupon formally approved the action taken by Mr. Campbell in granting this license.

Remarks by H. M. Curran.—At the invitation of the President, Mr. H. M. Curran, of the Philippine Forest Reserve, temporarily a Special Agent in the Division of Forestry, addressed the Board. Mr. Curran referred briefly to his findings in regard to the forest in the Koolau District, Maui, as set forth more at length in his report to the Board dated May 12, 1911, and then went on to point out certain things which in his judgment the Territory should do to get the most good out of its forest properties.

In substance his recommendations were that all available waste land controlled by the government, especially tracts near markets, should be got under forest, so that in due course wood could be cut and sold and a revenue derived for the use of the Board. He favored the extension of the algaroba forest on the dry hills back of Honolulu and in other like situations, as well as on the areas on the plantations not suitable for more intensive forms of agriculture.

Further, Mr. Curran thought that some arrangements ought to be made whereby at least a part of the revenues derived from the use of water from the forest reserves should be made available for the use of the Board in conducting and especially in extending its forest work. He said that in his judgment it ought to be possible to make the Hawaiian forests yield in wood and water handsome returns each year. The European forests yield from \$2.00 to \$5.00 per acre per annum. With water playing the large role that it does in Hawaii it should be possible to get somewhat similar returns here.

Finances.—After some discussion of the financial situation of the Board it was voted that the chairmen of the three principal committees look thoroughly into the matter, particularly with regard to the allotment of special work, and report to the Board at a subsequent meeting.

MEETINGS TO CONSIDER FINANCES.

On May 20, 22 and 23 the Board held special meetings to consider the financial situation of the Board, especially with refer

to the allotment for the coming fiscal period. On May 12, 1911, the Conservation Fund Apportionment Board rescinded the schedule of allotments under which the Board was working and reappropriated, for the period of 15 months from April 1, 1911, the following amounts:

For the general use of the Board, \$52,500. (This is \$3,500 per month, a continuance of the existing arrangement.) For completing the forest planting in the Pupukea Forest Reserve, now in progress, \$815. For planting and fencing the Kohala Mt. Forest Reserve, \$65,000. For inspection of fruits, plants, etc., for transportation between the islands, \$6,000.

The several chiefs of Division having been directed to submit reports, filed statements showing that to carry on the work of the Board as it is at present organized, would require \$60,949, as against the allotment by the Apportionment Board of \$52,500. Voted that the members of the Board take up the matter with the Governor and Board of Apportionment to see if it is not possible in some way to increase the Board's allotment.

The Acting President announced that Mrs. C. H. Brown had tendered her resignation as secretary of the Board. Voted that this resignation be accepted as of May 31. An application from the Hawaiian Agricultural Co. for a license to maintain flume lines in the Kau Forest Reserve was referred to the Superintendent of Forestry for recommendations.

An application from the California Cultivator for the use of the plates appearing in the last report of the Board of Agriculture and Forestry was refused, it being the sense of the Board that it was inadvisable to permit such use of the Board's plates unless the article to accompany them could be prepared under the supervision of the Board.

DIVISION OF FORESTRY.

ROUTINE REPORT.

Honolulu, May 10, 1911.

Commissioners of Agriculture and Forestry,
Honolulu, HI.

I have the honor to submit the routine report of the Division of Forestry for the months of March and April, 1911.

BIENNIAL REPORT.

The biennial report for the biennial period ending December 31, 1910, was completed on March 11. Copies were distributed to the several persons in the Territory and sent to the several persons on our mailing list, outside the islands. A total of 5000 copies was printed of which 500 were bound in separate

TREE PLANTING.

Following an official call for tenders for planting an area of government land on the Kohala Mountain, above Waimea Village, Kohala, Hawaii, a contract has been entered into with Mr. A. W. Carter. The planting is to be carried out in accordance with a planting plan drawn up by this Division last year. The object is to replace a stand of forest on a section of the Kohala Mountain from which water is obtained for use on the plains below. To attend to the details of this matter and get the work actually started, Mr. Haughs went over to Hawaii and was at Waimea during the first ten days of April. The money for this planting comes from a special allotment made from the Conservation Fund in 1910.

The other government forest planting project authorized out of this special allotment, the planting of the portion of the Pupukea Forest Reserve, Oahu, formerly known as "Water Reserve C," is also progressing favorably. An examination recently made of the trees planted last year showed that approximately 85% of those set out have now reached the height of three feet—the height required before the second installment of the contract price could be paid the contractor. This young forest will in a short time now make a marked difference in the appearance of the upper lands at Pupukea. It cannot fail to be of benefit to that section of the island in a number of ways.

FOREST FIRES.

On April 1, a forest fire at the head of Manoa Valley gave the staff of the Division of Forestry a brisk fight for a few hours, until it was got under control. The fire escaped from Chinese laborers who were burning brush above Mr. James Boyd's place, and ran up the steep ridge into a mass of Staghorn fern under an open stand of Koa trees. Fortunately, members of the staff, with the President of the Board, happened to be in Manoa Valley when the fire was discovered, so that no time was lost. Several laborers were secured locally, who got the fire under control. Later in the evening, thanks to the courtesy of Sheriff Jarrett, a gang of prisoners was sent up the valley. These men continued to patrol the burned area during the night. It is estimated that the area burned over was between 20 and 25 acres.

On April 28, Mr. Haughs responded to a call that there was a forest fire in the mountains in the Ewa District. This fortunately proved to be a mistake, the reflected light from cane trash fires in a new locality being responsible. But had there really been a fire, the presence on the ground of a member of this staff would have led to prompt action in combating it.

WOOD ON TANTALUS.

During April arrangements were made for the utilization of certain Eucalyptus trees blown down in the Tantalus forest during a Kona storm in February. Some of the trees were cut up into posts which will be used in durability tests on the grounds of the College of Hawaii in Manoa Valley. From others timbers were cut out that will be tested in the harbor as to their value for piling. Some of the wood will be cut into blocks for trial as wood paving. The rest will be sold as firewood. The money from this sale goes into the Treasury as a general realization.

SEED LAW.

In accordance with the direction of the Board, the Superintendent of Entomology and Forestry spent some time during April in the preparation of a Pure Seed Law, which was passed by the Legislature as Act 107. Copies of this law have been reprinted for distribution, here and abroad. It is suggested that it would help in its enforcement and tend to prevent the introduction of weeds into Hawaii if persons ordering seed in quantity were to send copies of this Act with their order. The Board will be glad to supply copies of the law on request.

INVESTIGATION OF KOOLAU, MAUI, FOREST.

For some time arrangements have been under way whereby one of the Foresters of the Philippine Bureau of Forestry should visit Hawaii for the purpose of consultation over certain forest problems presented by the death of a portion of the native forest in the District of Koolau, Maui. During April this project has been carried out by the visit of Mr. H. M. Curran of the Philippine staff, who has stopped over between transports on his way back to Manila from the mainland. Temporarily Mr. Curran has been appointed Special Forest Inspector in the Division of Forestry.

The object of Mr. Curran's visit to Hawaii is to assist in working out plans for the replacement of forest on the areas where the old growth has been killed. To this end, he, with the Superintendent of Forestry, spent the fortnight from April 18 to the end of the month on Maui. A detailed report of recommendations as to how best to treat this forest will be submitted to the Board in the near future, prior to Mr. Curran's departure for Manila on the May transport.

BOTANICAL INVESTIGATIONS.

Early in April, Mr. J. F. Rock, the Botanical Assistant of the Division of Forestry, visited Hawaii to collect plant material in

the Districts of Puna and Kau, in the vicinity of the Volcano House, more especially on the section that it is proposed be set apart as a National Park. He found a number of interesting plants, some new to science, of which further mention will be made hereafter.

Later in April, Mr. Rock accompanied Mr. Hosmer and Mr. Curran on their trip to Maui, remaining after their return to collect additional material in the Koolau and Hana Districts. From these several expeditions the Herbarium is decidedly the gainer. A later report will give a summary of the results obtained.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

NOTES FROM THE NURSERY.

For the months of March and April, 1911, there were distributed from the Government Nursery the following plants:

	In seed boxes	In boxes transplanted	Pot grown	Total
March sold	58,000	450	2,857	61,307
gratis	2,500	660	351	3,511
	<hr/> 60,500	<hr/> 1,110	<hr/> 3,208	<hr/> 64,818
April sold	3,000	550	644	4,194
gratis	3,000	....	151	3,151
	<hr/> 6,000	<hr/> 550	<hr/> 795	<hr/> 7,345

The collections for these months were: March, \$167.55; April, \$30.00. Of the March amount, \$100 was received for plants grown at the sub-nursery at Homestead, Kauai, conducted under the supervision of Mr. W. D. McBryde.

From April 4 to 11, the Forest Nurseryman was at Waimea, Hawaii, arranging details in connection with the forest planting on the Kohala mountain, now being carried on for the Board, under contract, by the Parker Ranch.

There are now at the Makiki Garden a large number of plants new to the Territory resulting from the seed sent back from various foreign countries by Mr. Gerrit P. Wilder. Some of these are sure to prove useful introductions to Hawaii.

PUNA FOREST RESERVE.

Honolulu, June 8, 1911.

The Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—I have the honor to recommend the creation of a forest reserve in the District of Puna, Island and County of Hawaii, to be known as the Puna Forest Reserve, covering a tract of 19,850 acres of government land.

The area in question is the tract of government land known generally as Kaohe, lying mauka of the homesteads near Pahoa, on a portion of which the Hawaiian Development Company is now conducting logging operations under a license from the Territorial Government, granted in January, 1910.

It will be recalled that in the autumn of 1909 the question was before the Board of setting apart this area as a forest reserve. But because certain of the area proposed to be set apart was regarded as potentially agricultural land, which, after it had been cut over was to be subject to homesteading, the Governor thought it inadvisable to set the land apart as a forest reserve at that time.

During the past year the area supposed to be most fit for agriculture, that is, the section nearest the existing Kaohe Homesteads above Pahoa, has been logged. As the land further mauka is not deemed as suitable for agricultural use, the Governor is now willing to waive his objections and to set apart the portion of the tract that still remains uncut, as a forest reserve.

To this end a new description has been prepared by the Survey Office, eliminating the area of prospective agricultural land. The area originally proposed to be reserved was 23,850 acres; the area now recommended is 19,850 acres.

The proposed Puna Forest consists of a but little explored tract covered by a more or less heavy stand of Ohia Lehua forest, interspersed with open lava fields, and areas of scrub growth. The logging operations of the Hawaiian Development Company are gradually opening up the section, but as yet much of it remains inaccessible. The value of this forest is primarily because the wood and timber from it is of commercial importance and can be sold. As pointed out by me in earlier reports, especially in a report dated June 1, 1910, that was published in the Hawaiian Forester and Agriculturist for January, 1910, Vol. VII, No. 1, at present the Puna forest is now at a point of growth where it can be cut. All things considered I believe it was good policy to grant the logging license now in force.

By setting apart this area as a forest reserve it will bring the Puna forest under the control of the Board of Agriculture and Forestry. It will make it possible for the Board to regulate the cutting of the timber cut, for as soon as the land is cut over it can be set apart as a forest reserve. The forest products

sold therefrom come to the Board, under the law, as a special fund to be used for forest work.

Believing that the forest lands of the Territory should be handled by the Board of Agriculture and Forestry and for the special reason outlined above, I recommend that the Board approve the setting apart of this area as a forest reserve, and that a formal request be made to the Governor that he proceed with the necessary steps so to set it apart.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

THE MAUI FORESTS.

BY H. M. CURRAN,
Philippine Bureau of Forestry.

Honolulu, T. H., May 12, 1911.

To the Board of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—I have the honor of submitting the following report on the condition of the forests on the windward slopes of Mt. Haleakala, Maui, and to recommend certain measures for the protection and improvement of this valuable property.

GENERAL STATEMENT.

From the forests of Mt. Haleakala the greater part of the agricultural water, used on the island of Maui, is derived. These forests yield a revenue of over \$50,000 a year in water rights alone. The present forest area is much less than formerly due to unrestricted grazing and timber cutting on leased and private lands. The principal areas of water bearing forest are now fenced and protected from grazing and cutting.

DEAD TIMBER.

Extending along the line of the main ditch for 10 miles and with an average width of less than a mile is an area of forest in which irregular patches of dead and defective timber occur covering perhaps one-fifth of its total area, or approximately two square miles. The death of this timber is reported to have occurred during the past five years.

Wind storms of exceptional violence occurred about 5 years ago. Very soon after these storms it was noticed that the trees were rapidly dying. The areas which suffered most were ex-

posed flats where adverse soil conditions,* excessive moisture, and the opening of the forest by grazing and ditch construction had reduced the normal vigor of the forest cover to a point where it was unable to withstand any further increase of unfavorable conditions. It is therefore probable that heavy winds may be regarded as the immediate cause of the death of the forest.

A close examination of the affected areas shows a return of all elements of the original cover. Herbaceous and shrubby plants are coming in rapidly and the trees very slowly. In the virgin forest beyond the principal tract of dead timber are older areas where the trees have been killed, probably by a similar combination of adverse conditions. These older areas are in various stages of return to normal forest cover.

It is believed that the dying of the forest in this region is not a new and dangerous condition liable to spread rapidly, and cause a complete destruction of the water bearing forest, but that since the first establishment of forests on the bare volcanic slopes they have been subject to injury by wind and that certain areas where conditions were least favorable to tree growth have been periodically denuded.

Abnormal conditions, due to the interference by men and grazing animals with the normal forest cover, have accentuated the already extremely unfavorable conditions and made it possible for the winds to devastate larger areas than formerly.

It is believed that if in the future proper precautions are taken to prevent the opening of the forest, and especially if a certain amount of planting for windbreak purposes be undertaken, the damage from winds may be reduced to a comparatively small area and the forest cover extended and improved very materially. The object of windbreaks is not so much to prevent the throwing of the trees as to make possible better leaf development. With this protection the forest, even if shallow rooted, may reasonably be expected to re-establish itself.

RECOMMENDATIONS.

It is further recommended that the entire windward forest area on Mt. Haleakala be organized into a single property under a technically trained forester and his necessary assistants, and that 20% of the gross revenues derived from the property for water and other rights be expended annually for its protection and improvement.

* Dr. H. L. Lyon (see The Hawaiian Planters' Record, Vol. I, Nos. 3 and 4, 1909) places the adverse soil condition as the principal cause of the trouble. In my opinion the condition of the soil should occupy a secondary place. The extended investigation of the different members of the Hawaiian Sugar Planters' Experiment Station force entitle their opinion to greater weight than my own investigation made in a few days and long after the dying of the forests.

In case it is impossible at once to perfect this organization it is suggested that the interests with water rights in the forest be induced to spend not less than \$5,000 a year in planting and protection work under the direction of the Superintendent of Forestry.

And it is further suggested that for money so expended on government lands the individuals and corporations who bear the expense of this planting shall be allowed to remove from public forests timber and firewood whose value shall not exceed the amount of money expended by them in such planting. Timber and firewood to be removed only at such times and in such a way as the Superintendent of Forestry shall direct.

DIVISION OF ENTOMOLOGY.

REPORT ON INTER-ISLAND INSPECTION OF FRUITS, VEGETABLES, PLANTS AND SOIL.

Honolulu, June 8, 1911.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—I have looked into the various phases which will present themselves when inter-island inspection of fruits, vegetables, plants and soil is taken up and the following suggestions may be useful in the getting up of rules and regulations pertaining to the inspection.

I believe that it is not necessary to have trained scientists as inspectors in inter-island inspection, but to have good reliable men it for police duty on the same line as are used by the health board. The main object in this inspection work is to see that no fruits or plants or soils are shipped out of or into the other islands, and this does not require inspection for infestations generally speaking. Men for this work, I believe, can be obtained here.

I believe that in conjunction with inter-island inspection there should be established a local inspection which for a beginning could be started with two good men and their main duty would be to visit the various fields and gardens, especially about Honolulu and force the growers to practice clean culture, by which is meant the destruction of all fruits and vegetables which are found infested with the melon fly and fruit fly and other injurious insects whose spread is becoming a menace to the smaller industries.

I believe that this will tend to greatly reduce existing pests, as it will prevent in a great measure the enormous increase which such fruits and vegetables, now allowed to remain undestroyed in the fields, are causing. The money used would be of untold value to the Territory and would do much to prevent the spread of pests to the other islands. If any pest is reduced by clean culture there is less chance for marketable fruit being infested, but on the

hand when pests are permitted to increase at will (through the careless neglect to gather up and burn all infested produce in the field) we shall have not only double work to perform, but all this will tend to discourage the small farmer and other branches advocated by the Governor, such as field demonstrations for the homesteader and the opening of markets, which are to be taken up by the Federal Experiment Station.

If the funds set aside for inter-island inspection can be used for this work, I believe that the Board of Agriculture has the power, with the consent of the Governor, to pass the necessary regulations to cause the destruction of infested and worthless produce in the fields and gardens and markets.

The Mediterranean fruit fly is proving a great pest. We even found it attacking green peppers and when island fruits are out of season the insect might take to other fruits and vegetables in its struggle to survive. The melon fly has been a great menace for many years and has been reared from oranges. All this goes to show that unless we can begin to cope with these two pests in some way, pending the finding of their natural enemies, cultural matters will become worse as time goes on. Individuals are willing to destroy all infested produce, but the constant complaint is that the neighbor won't do anything. In California the man who neglects clean culture and wilfully breeds pests is prevented from doing so by certain laws which are enforced by field inspectors. Why cannot this be done here in Hawaii?

Why should the melon grower be allowed to leave infested melons lying about his field or why should the pineapple grower be permitted to allow old discarded plants, badly infested with mealy bugs, to remain stacked up along the roadside?

Respectfully submitted,

EDW. M. EHRRHORN,
Superintendent of Entomology.

REPORT FOR MAY.

Honolulu, May 31, 1911.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen:—I herewith respectfully submit my report of the work of the Division of Entomology for the month of May.

During this month we boarded 31 vessels and we found fruit, vegetables and plants on 20 of them.

The usual careful inspection was made of all the shipments with the following result:

<i>Disposal with principal causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	1123	12,194
Destroyed	17	17
Fumigated	10	53
Total	1150	12,264

RICE SHIPMENTS.

The rice shipments exceeded 30,000 bags this month amounting to a total of 30,218 bags. We examined each consignment carefully and found these free from weevils and other pests.

PESTS INTERCEPTED.

On a shipment of Orchids and Birdnest ferns from Manila we found quite a number of insect pests and most of the sending was destroyed. Several Maple trees and pine trees from Japan being infested with scale insects were destroyed. One lot of Chrysanthemums from Ohio arrived by mail and was very badly infested with the black Chrysanthemum aphid. We returned this to the Ohio shipper and notified him of our laws and regulations. We don't expect any further trouble from that section.

There was quite a stir the other day in town on account of the discovery of a small snake found in the sand at the new building on Fort street. The sand came by the vessel W. P. Frye and the snake was a very small watersnake, ten inches long, which had evidently been scooped into the vessel from barges which bring the sand from the creeks. Snakes are sometimes reported by stable men as being found in bales of hay. Whenever we hear of such introductions we generally find out where the snakes are and see to it that they are killed. The W. P. Frye snake is in alcohol at the laboratory.

During the month there arrived two Queenbees by mail for W. L. Hardy, Hana. Mr. Hardy notified us of this shipment long before it arrived and we found all according to regulations.

BENEFICIAL INSECTS.

Three colonies of *Vedalia cardinalis* were sent out on request, one to Molokai and two to Kahuku plantation, where the Ironwoods were badly infested with Cottony Cushion Scale.

Starting June 1st I have engaged Mr. Valentine Marcallino to act as Wharf Assistant for this Division, it being of the greatest necessity for efficient work in the inspection line.

HILO INSPECTION.

My inspector at Hilo, Brother Newell, reports the arrival of six steamers and one sailing vessel. Five steamers brought vege-

table matter consisting of 132 lots and 1313 parcels of which 3 parcels had to be treated to fumigation on account of aphids.

Respectfully submitted,

EDW. M. EHRHORN,
Superintendent of Entomology.

BY AUTHORITY.

**PROCLAMATION OF FOREST RESERVE IN THE DISTRICTS OF
SOUTH KONA AND KAU, ISLAND AND COUNTY OF HAWAII.**

Under and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I, Walter F. Frear, Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said acts provided, do hereby recommend and approve as a Forest Reserve to be called the "South Kona Forest Reserve," those certain pieces of government and privately owned land in the Districts of South Kona and Kau, Island of Hawaii, which may be described roughly as being the area of forest lying between the upper edge of the section of cleared land along the Government Road and the western boundary of the land of Kahuku, extending from the land of Kaohe to the land of Manuka, inclusive, and containing an area of 36,952 acres, more or less, in the Districts of South Kona and Kau, Island and County of Hawaii, Territory of Hawaii, more particularly described by and on maps made in August, 1910, by the Government Survey Department of the Territory of Hawaii, which said maps are now on file in the said Survey Department marked Government Survey Registered Maps Nos. 2468 and 2469 and "Waiea-Kipahoe Forest Reserve" and "Kapua-Manuka Forest Reserve" respectively, and a description accompanying the same in three parts numbered C. S. F. 2211, 2245 and 2246, which said description now on file in the said Survey Department, is as follows:

SOUTH KONA FOREST RESERVE.

KAOHE-OPIIHALI SECTION.

Including the lands of Kaohe 1, 2, 3, 4 and 5, Waikakuu, Kukuipae, Kolo, Ololomoana 1 and 2, and Opiihali 1 and 2.

C. S. F. 2246.

Beginning at a + on set stone and ahu at the southeast corner of Lot 12, Ololomoana Homesteads, and on the Opiihali 2nd and Kaapuna boundary, the co-ordinate referred to Government Survey Trig. Station "Kipahoe" being: 4713.6 feet North and 4982.0 feet East, as shown on Government Survey Registered Map No. 2468, and running by true azimuths:

1. 194° 30' 1300.0 feet along Ololomoana Homestead Lot 12 to a + on set stone and ahu;
2. 207° 57' 1325.0 feet along Ololomoana Homestead Lot 11 to spike in pahoe and ahu;
3. 224° 20' 2290.0 feet along Ololomoana Homestead Lot 10 to ahu;
4. 219° 23' 1641.0 feet along Ololomoana Homestead Lot 9 to a + on set stone and ahu;
5. 182° 10' 972.0 feet along Ololomoana Homestead Lot 8 to a + on set stone and ahu;

6. 190° 00' 859.0 feet along Olelomoana Homestead Lot 7 to a + on set stone and ahu;
 7. 188° 00' 30.0 feet across road to a + on set stone and ahu;
 8. 182° 30' 1105.0 feet along Olelomoana Homestead Lot 6 to an unmarked point on the boundary between Olelomoana 1st and 2nd;
 9. 176° 43' 1520.0 feet across the land of Olelomoana 1st to an unmarked point on the boundary between Olelomoana 1st and Kolo;
 10. 180° 00' 2855.0 feet along Grant 3607 to J. M. Monsarrat to a + on set stone and ahu;
 11. 85° 40' 2188.0 feet along Grant 3607 to J. M. Monsarrat to a Δ on set stone and ahu;
 12. 213° 27' 254.0 feet along Grant 1975 to Maele to a + on set stone and ahu;
 13. 201° 49' 204.0 feet along Grant 1975 to Maele to a + on set stone and ahu;
 14. 190° 59' 230.0 feet along Grant 1975 to Maele to a + on set stone and ahu;
 15. 263° 05' 1930.0 feet along Kukuiopae Homestead Lot 7 to a + on set stone and ahu;
 16. 172° 44' 2577.0 feet along Kukuiopae Homestead Lots 7-6-5-4-roadway and Lot 3 to a + on set stone and ahu;
 17. 191° 40' 762.4 feet along Government land to an unmarked point;
 18. 187° 00' 551.0 feet along Grant 2368 to Ohua to a + on set stone and ahu;
 19. 187° 05' 1065.6 feet across the land of Kaohe 4 to a + on set stone and ahu at the Southeast corner of Grant 1973 to Pahua, the true azimuth and distance to "Eleele" Trig. Station being; 115° 05' 93.0 feet;
 20. 194° 36' 1345.0 feet along Grant 1973 to Pahua to a + on set stone and ahu by large ohia tree;
 21. 106° 33' 145.2 feet along Grant 1973 to Pahua to a + on set stone and ahu;
 22. 169° 00' 564.3 feet along Grant 2024 to Kuaimoku;
 23. 173° 30' 143.9 feet along Grant 2024 to Kuaimoku;
 24. 168° 00' 309.0 feet along Grant 2024 to Kuaimoku;
 25. 172° 00' 85.8 feet along Grant 2024 to Kuaimoku to a point on Pahoehoe 2nd and Kaohe 1st boundary, the coordinates of said point referred to "Pahoehoe" Trig. Station being; 6075.4 feet South and 6818.8 feet East;
 26. 268° 16' 45" 23857.0 feet along the land of Pahoehoe 2nd;
 27. 7° 48' 3065.5 feet along Kahuku boundary to an unmarked point on the North side of a small gulch, the true azimuth and distance to "Kamakaili" Trig. Station being; 275° 45' 3760.0 feet;
 28. 27° 52' 30" 11753.0 feet along Kahuku boundary to a W marked on stone set in Hitchcock's old ahu on the old Kukuiopae trail through Kipuka;
 29. 11° 41' 2720.0 feet along Kahuku boundary to Hitchcock's old ahu on aa flow in a small kipuka;
 30. 8° 45' 5280.0 feet along Kahuku boundary to the Northeast corner of the land of Kaapuna, the coordinates of said point referred to "Pahoehoe" Trig. Station being; 26670.8 feet South and 23401.4 feet East;
 31. 89° 47' 20345.0 feet along the land of Kaapuna to the point of beginning.
- Area 9770 Acres.

KIPAHOEHOE SECTION.

Including the greater portion of the Government land of Kipahoehoe.
C. S. F. 2245.

Beginning at the Government Survey Trig. Station "Kipahoehoe" (marked by an iron bolt) the true azimuth and distance to "Lae o Heku" Trig. Station being: $117^{\circ} 15' 04''$ 5188.1 feet and to "Waha Pele" Trig. Station being $6^{\circ} 12' 53''$ 8280.7 feet, as shown on Government Survey Registered Map No. 2468, and running by true azimuths:

1. $208^{\circ} 11'$ 2412.0 feet along Kipahoehoe remainder to an orange tree marked K at Pohakaka on the Kipahoehoe-Kaapuna boundary;
2. $272^{\circ} 22'$ 2007.0 feet along the land of Kaapuna to a small iron pin and large ahu on the mauka side of Government belt road and on the South side of a small gulch;
3. $272^{\circ} 50' 45''$ 26130.0 feet along the land of Kaapuna to a buried bottle in the center of Hitchcock's old ahu on the aa in a kipuka near the edge of the forest;
4. $317^{\circ} 02'$ 3244.0 feet along the Kahuku boundary;
5. $76^{\circ} 47'$ 24624.0 feet along Alike Homesteads, Lot 1, Grant 5045 to J. Deniz to fence corner on site of old corner ahu;
6. $99^{\circ} 03'$ 1570.5 feet along Grant 3153 to Makia & Keaweokaliko to a + on set stone and ahu on edge of aa;
7. $83^{\circ} 23'$ 2190.0 feet along Grant 3153 to Makia & Keaweokaliko to old K marked on solid pahoehoe rock at old Government road;
8. $100^{\circ} 59'$ 1638.0 feet along Grant 3153 to Makia & Keaweokaliko to a + on solid pahoehoe;
9. $93^{\circ} 32'$ 2182.0 feet along Grant 3153 to Makia & Keaweokaliko to a + on solid pahoehoe near edge of pali;
10. $180^{\circ} 15'$ 6816.0 feet across the land of Kipahoehoe to the point of beginning.
Area 4590 Acres.

KAPUA-MANUKA SECTION.

Including portions of the lands of Honomalino, Kapua, and Kaulanamauna, in South Kona, and portion of the land of Manuka, in Kau, Island of Hawaii.
C. S. F. No. 2211.

Beginning at Government Survey Trig. Station "Puu o Ahohia" (marked by a large ahu) at the East corner of this reserve and at the common corners of the lands of Kaulanamauna and Manuka on the Kahuku boundary, from which station the true azimuth and distance to Government Survey Trig. Station "Puu o Keokeo" is $211^{\circ} 52' 08''$ 13078.1 feet, as shown on Government Survey Registered Map No. 2469, and running by true azimuths:

1. $28^{\circ} 55' 30''$ 6621.6 feet along the land of Kahuku to a + on set stone and ahu at Pohakuloa, a small rocky hill in large sand flat;
2. $16^{\circ} 41'$ 16705.0 feet along the land of Kahuku to Honopu, a small black rocky hill on aa flow;
3. $40^{\circ} 33'$ 11883.0 feet along the land of Kahuku to on pahoehoe and ahu at Kahiawai on the lower side of the Government Road and on the South side of a gulch;
4. $345^{\circ} 02'$ 1528.0 feet along the land of Kahuku to a bottle placed in the center of Hitchcock's old ahu at Puu Ainako, on the lower side of a gulch and just North of the old Government Road;
5. $34^{\circ} 30'$ 5280.0 feet along the land of Kahuku to an unmarked point;

6. 17° 52' 7000.0 feet along the land of Kahuku to an unmarked point;
 7. 134° 29' 24460.0 feet across the Government lands of Manuka and Kaulanamauna to an unmarked point on the Kapua boundary;
 8. 233° 20' 20" 13000.0 feet along the land of Kapua to a + on set stone and ahu on the lower side of the Government Road at place called Uwo;
 9. Thence along the upper side of the Government Road across the lands of Kapua and Honomalino to an unmarked point, the direct azimuth and distance being: 158° 00' 18000.0 feet;
 10. 277° 20' 5000.0 feet along Grant 4659 to W. C. Achi;
 11. 221° 56' 3104.0 feet along Grant 4659 to W. C. Achi;
 12. 170° 05' 8550.0 feet along Grant 4659 to W. C. Achi;
 13. 260° 15' 6375.0 feet along the land of Papa 2nd to ahu;
 14. 350° 15' 11750.0 feet along Grant 4731 to W. C. Achi to ahu;
 15. 250° 53' 17165.0 feet along the land of Kapua to ahu on the Kahuku boundary;
 16. 345° 39' 2244.0 feet along the land of Kahuku to Hitchcock's old ahu;
 17. 1° 04' 1711.0 feet along the land of Kahuku to ahu on the North edge of aa flow;
 18. 263° 44' 3676.0 feet along the land of Kahuku to the point of beginning.
- Area 22,592 Acres.

And as provided by law, subject to the existing leases, I do hereby set apart as parts of the South Kona Forest Reserve those portions of the government lands known as Kaohe Tract (1555 acres), Kukuipapae Tract (2760 acres), Olelomoana-Opihiali Tract (3885 acres), Kipahoe (4590 acres), Honomalino (2540 acres), and Kaulanamauna (2060 acres) in the District of South Kona and Manuka (11,870 acres) in the District of Kau, altogether an area of 29,260 acres, more or less, that lie within the metes and bounds of the above described South Kona Forest Reserve.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.

Done at the Capitol in Honolulu, this 17th day of May,
A. D. 1911.

W. F. FREAR,
Governor of Hawaii.

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JULY, 1911

No. 7

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugh, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications **SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.**

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. VIII.

JULY, 1911.

No. 7.

A broadside has been received by the Forester, containing the advance premium list of the annual exposition of Dry Farmed Products, to be held under the auspices of the International Dry Farming Congress, at Colorado Springs, October 16-21, 1911. Premiums and trophies amounting in value to \$5000 will be paid out for prize awards. The grand sweepstake prize will be a trophy in the form of a cup worth \$250. There is considerable dry farming in Hawaii, and probably scope for more than exists, but in most cases those engaged in it could hardly afford to show anything at any exposition outside of the islands. Yet it might be of great advantage to agriculture in this Territory if it were represented at such a fair as this one by someone competent to make observations and acquire and collate data on the subject of dry farming. In the same connection, the idea occurs that, among the various objects of public aid to agriculture here which the legislature appropriates, a moderate fund might be provided for sending exhibits, or at least sample lots, of raw and preserved agricultural products to such important exhibitions or great fairs as may be held from year to year at central points on the mainland. There should be no trouble about enlisting the good offices of some responsible person of the place where the show was to be held to handle the exhibit or distribute the samples and attractive literature pertaining both to the products and the islands. Such a campaign would fit in well with the movement to market Hawaiian products.

Mr. C. S. Sterrett, of Los Angeles, the marketing expert brought here under legislation of last session, but only accepting a temporary engagement instead of the permanent one intended for such an official, is now making a tour of the group in company with Dr. E. V. Wilcox, director of the Hawaii Experiment Station. Some of his findings at different places already published in the newspapers indicate that his employment will yield a valuable body of information and advice, which it will then remain for our agricultural authorities and producers to turn to practical account. It will not do to allow his report to be uselessly buried in the archives, like the productions of many government commissions on various subjects for which the taxpayers of Hawaii have paid more or less liberally in years past.

Mr. C. S. Judd, the newly appointed head of both the agricultural and the public lands departments, has arrived and will enter upon the duties of his offices the first of next month. Both as a Hawaiian-born citizen and a trained expert in the Federal bureau of forestry, Mr. Judd is generally welcomed to the management of these supremely important subdivisions of the Territorial Government.

Mr. F. A. Clowes, of the Hawaii Experiment Station, is quoted from Hilo as stating that about 3000 pounds of island butter is being consumed monthly in that town and neighborhood, for which the makers average about forty-five cents a pound. This means that \$1350 a month, or \$16,200 a year, is received by the less than twenty small farmers that are said to be engaged in the business. With some of these dairying is the exclusive occupation. Further, the encouraging feature of the industry is mentioned that consumers ask for island butter and are willing to pay more for the first quality article of such than for the best imported.

In the catalogue of new bulletins in the Monthly List of Publications of the United States Department of Agriculture are the following: "The Sugar-cane Insects of Hawaii, by D. L. Van Dine, special field agent, pp. 54, pls. 4, figs. 5 (Bulletin 93, Bureau of Entomology);" "The Assimilation of Nitrogen by Rice, by W. P. Kelley, chemist, under the supervision of Office of Experiment Stations, U. S. Department of Agriculture, pp. 20 (Bulletin 24, Hawaii Agricultural Experiment Station)." There are two circulars mentioned which might be of value to agriculturists in these islands—one treating of the damage to sugar cane in Louisiana by the sugar-cane borer, by T. C. Barber, agent and expert; and one dealing with the mango weevil, by C. L. Marlott, entomologist.

An article in the Pomona Journal of Economic Botany, on the Avocado in Southern California, is reviewed in the Agricultural News (West Indies). The review says: "Information is given to show that seedlings of West Indian and Hawaiian varieties have been grown in California, but the plants are not sufficiently old to afford definite indications as to their value."

THE EXTENSION WORK OF THE COLLEGE OF HAWAII, 1908-1911.

The College of Hawaii, established in 1908, is youngest of all the "Land Grant" Colleges of Agriculture and Mechanic Arts. It is a unique institution in many respects. Its insular position at the "Crossroads of the Pacific" gives it an unusually broad outlook toward the deeds and the needs of all countries and all peoples. Its student-body is drawn from an island population composed of a remarkable variety of ethnic elements—Polynesian, Oriental, Latin, and Teuton. The climatic conditions of its vicinity make possible peculiarly felicitous opportunities for the study of sub-tropical life, industries, and conditions.

Not least in the role of its unique features is its history, especially as regards extension teaching. There is perhaps no other institution of collegiate rank in existence that at so early a stage in its history took an active interest in the dissemination of collegiate advantages through the various channels of extension work. The College of Hawaii has made rapid use of the experiences of her sister institutions on the mainland. The privilege of carrying the "Gospel of Education" directly to all the people has been considered, from the very infancy of the institution, as one of its fundamental duties.

The College of Hawaii owes its origin to an act of Congress entitled "An Act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts," approved July 2, 1862. The amount set aside was 30,000 acres for each senator and representative in Congress. This land was to be sold, and the income devoted to "the endowment, support, and maintenance of at least one college" (in each State and Territory), "where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts (in such manner as the legislatures of the States may respectively prescribe), in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

A resolution was framed by Mr. Wallace R. Farrington, and introduced by Representative Coelho, of Maui, in 1905, by which the Commissioners of Public Instruction were authorized to thoroughly investigate the requirements under the Federal law and other matters regarding the establishment and maintenance of a college of agriculture and mechanic arts. After considerable investigation by a committee of the Department of Public Instruction, a report was presented to the 1907 legislature, which resulted in the appointment of a special committee from the

University Club, consisting of Hon. H. E. Cooper, Mr. C. R. Hemenway, and Mr. R. S. Hosmer. Two acts were framed, introduced by Senator Coelho, and passed by the legislature, regular session 1907, without opposition: Act 24 provided for the establishment of the college; Act 94 made special appropriation for the biennial period ending June, 1909.

Short Courses.

The first funds of the College became available in July, 1907; the first prospectus of courses was issued January 1, 1908, and the first regular classes were held in February, 1908. This month, February, 1908, in which the first regular instruction of the College began, witnessed also the inauguration of the first short courses. These began February 18th and closed March 31st. They consisted of twenty-six evening sessions, from 7:30 to 9:30 o'clock, on Tuesdays and Thursdays. A printed announcement of these courses was issued, stating that "the College of Agriculture and Mechanic Arts has arranged a course of evening lessons for which there are no requirements other than interest and good attention."

The following synopsis will give a general idea of these courses:—

BOTANY—Jared G. Smith, Director, Federal Experiment Station.

- Lesson 1. Vegetable cell—structure, growth, contents, etc.
 2. *a* Organs of vegetation—root, stem, and leaf.
 b Process of assimilation and growth.
 3. The flower—plan, organs, etc.
 4. *a* Fertilization in flowers.
 b Fruits—nature, kinds, etc.

ECONOMIC ENTOMOLOGY—D. L. Van Dine, Entomologist, Federal Experiment Station.

- Lesson 1. Place of insects in animal kingdom; characteristics, etc.
 2. Life-history; development, metamorphosis.
 3. Injurious insects and their control.
 4. Hawaiian entomology.
 5. Scale insects—distribution; introduction.
 6. Beneficial insects—direct; indirect.

HORTICULTURE—W. T. Pope, Dean, College of Hawaii; J. E. Higgins, Hort., Federal Expt. Station.

- Lesson 1. General survey of Hawaiian fruits.
 2. Germination of tree seeds; growth of seedlings.
 3. Care and cultivation of fruits in general.
 4. *a* Propagation of plants.
 b Budding; grafting; pruning.

5. Culture of citrus fruits in Hawaii.
6. Ornamental shrubbery of Hawaii.
7. Banana; avocado, mango; papaia; culture of each.
8. Marketing of Hawaii fruits; picking; packing; shipping.

SOIL—W. T. Pope.

- Lesson 1. Origin, properties, plant-food, etc.
 2. Classification; tillage, drainage, etc.

COMMERCIAL FERTILIZERS—F. G. Krauss, Agronomist, Federal Experiment Station.

- Lesson 1. Chemical constituents, values, etc.

PLANT BREEDING—F. G. Krauss.

- Lesson 1. Production of new varieties, etc.

FARM CROPS—F. G. Krauss.

- Lesson 1. Farm crops for Hawaii.

FORESTRY—R. S. Hosmer, Territorial Forester.

- Lesson 1. Forestry in general.
 2. Hawaiian forestry.

At the last session of the series Mr. J. G. Smith gave a summary on agricultural literature, where information may be found, and how to make use of it.

Much interest was manifested by the people of Honolulu in this first extension work, the sessions were well attended and regularly attended. The courses did much to give Hawaii a favorable impression of the ideals and methods of the new institution.

Short Courses, 1909.

These short courses were indeed so much appreciated that they were continued on a similar plan in 1909. They comprised a series of twenty-six, on Monday, Wednesday, and Friday evenings of each week, March 3rd to April 2nd. The schedule was as follows:—

- March 3. Agricultural problems of Hawaii.
 Dr. E. V. Wilcox, Director, Federal Expt. Station.
 Economics of agricultural education.
 J. W. Gilmore, President, College of Hawaii.
- March 5. Entomological inspection—objects, methods, results.
 Jacob Kotinsky, Territorial Entomologist.
 Types of plant diseases.
 L. Lewton-Brain, Pathologist, S. P. Expt. Sta.
- March 8. Preservation of fruits.
 Miss Agnes Hunt, Dept. D. Sc. Col. of Hawaii.
 Poultry and profits.
 B. E. Porter, Dept. An Hus., Col. of Hawaii.

good reasons for students coming to the College for their instruction, there are also good reasons for the College going to the people; and more especially when the College offers instruction in subjects pertaining to the vocations of life.

That people may be taught in many of the subjects of the school and college curriculum through correspondence study is a demonstrated fact, and while the method lacks some of the advantages of resident study, it has certain advantages of its own. Among other things, it has a tendency to encourage self-reliance and self-determination. It affords earnest persons the opportunity of working and studying at the same time, and each student gets individual instruction. On the other hand, advanced subjects requiring extensive laboratory equipment are at a disadvantage as the manipulation of laboratory apparatus may not be taught by correspondence.

The specific classes of persons that correspondence study is designed to benefit may be enumerated as follows:

1. Those who want to learn but who are prevented from attending the College by exigencies of employment or place of living.
2. Those who find new demands made upon them by the progress of the industry in which they are engaged.
3. Those who are engaged in manual employments and who wish some mental activity to occupy their leisure hours.

Plan and Scope.

It is proposed that the College offer through correspondence study the following subjects: Soils and Crops, Plant Life, Poultry Husbandry, Domestic Science, Zoölogy.

The grade of instruction in these subjects will be in accordance with the ability and attainments of the students. Students taking any subject by correspondence shall be not less than fifteen years of age and shall not at the time of taking the course be in attendance at school.

Instruction in the subjects mentioned will be given by written lessons or assignments, the student returning a written report on each lesson or assignment according to the direction of the professor in charge. These reports will be carefully examined and returned to the student with such corrections, explanations, and suggestions as may be in the interests of the student. If each report meets the required standard, a new lesson or assignment will be sent.

Each subject consists of weekly assignments and each assignment may contain one or more lessons. The course of instruction will terminate with the close of schools in June. No preliminary examination will be required, but students must satisfy the professor in charge of the course that they can read and write Eng-

lish fluently. Application blanks may be had on request, and the College will offer assistance and suggestion in the choice of subjects. Students will be expected to complete at least one course in the time specified for the course.

A fee of \$5 will be charged for each full course of eighteen assignments. For additional courses a reduction of one-half for each course will be made. The fee is intended to pay the cost of the lessons and postage one way. If a student takes less than half of the assignments, one-half the fee remaining above the cost of material used will be refunded.

Subjects in Detail.

COURSE I—Soils and Crops: Readings and reports on the origin and formation of soils, their physical, chemical and biological properties, relation of soil properties to soil managements, the adaptation of crops to soil types, and the essentials of crop-producing power. The studies on crops will consist of readings and reports on the leading crops of the United States and Hawaii, their geography, economics of production, commercial importance, products, uses and culture methods.

COURSE II—Plant Life: This course covers the fundamentals of plant life, both as regards plants in their various relations to man and as independent forms of life. Emphasis will be laid on the practical phases of plant life, especially such aspects as are exemplified in Hawaii, and in tropical regions generally. References are given to available literature, and from time to time individual observations, records and experiments will be required. The faithful performance of the work outlined in this course should give the student a comprehensive knowledge of the basic principles of plant structure and growth and of the application of these in horticultural practice.

COURSE III—The course in poultry culture treats on the underlying principles of the profitable production of poultry products. The essential business elements which lie not only in the qualification of the poultry man but also in the quality of the stock investment will receive special consideration from the time the egg or the chick is produced until it reaches the consumer. Each student is urged to be actively engaged in some part of the business while taking the course, for observation, study and work go hand in hand in any successful undertaking.

COURSE IV—Course in Cooking: This course is intended to give some methods for the simpler dishes used in the diet. It includes text assignments giving something of the needs of the human system as regards the elemental food stuffs, the preservation of food, with a few special diets for children and the sick.

COURSE V—Course in Zoölogy: The course is intended to

give a grounding in the subject of general zoölogy with special reference to its economic aspects. It includes text assignments, written lectures and simple dissections of a number of common animals with a view of gaining an understanding of the salient points in their comparative anatomy. Note of the life histories, forms and habits of animals are included in order to show the adaptation of animals to various circumstances and conditions of environment. The course is intended for teachers and others with a taste for or a knowledge of the facts and material of zoölogy.

This circular was accompanied by an application form with spaces for date; name; residence; occupation; age; previous education; name of steamer carrying mail; period of arrival and departure of steamer; course desired; purpose in taking the course; and other courses desired than those listed.

Numerous inquiries were received regarding the course, and students on the various islands registered in the course on soils and crops, plant life, and poultry raising.

President Gilmore, in an article upon correspondence study in the Hawaiian Collegian, June, 1910, writes as follows:—

One characteristic that distinguishes our system of education in America from that of other nations is its democracy. We look upon our system of common schools as fundamental to the welfare of the nation and upon the colleges that have been established under the direction of national law as institutions that render large returns to the nation in the form of increased efficiency for its citizens. However, up to the present time our system of education has one element lacking in rendering its democratic application complete, and that is, it does not reach all the people all the time. Every one now recognizes that the acquirement of an education does not consist of a certain number of years spent in school or college or of absorbing facts during a stated period of time that relate to certain specified subjects. The acquirement of an education is closely correlated with the life activities of the individual and of the activities of his environment and is independent of age, sex or the period of acquirement.

Correspondence study is the agency by which this gap in the scheme may be filled. There always exists in every community persons who through conditions affecting their living or their environment are unable to avail themselves of the privileges of the public school system as it is at present organized. They may have had limited opportunities to acquire that standard of learning that would do them the greatest good. Such persons may have both capacity and ambition, but not opportunity. It is such persons as these that the branch of correspondence study in the public school system, if it is to present it should most beneficially, should have had the opportunity of attending

school could receive the benefits through this means, no doubt the efficiency of every community would be largely increased.

That instruction may be imparted through correspondence is a fact that has been demonstrated by experience, and while such instruction may lack some of the advantages of attendance within the walls of the schools or colleges, yet it has advantages of its own. The correspondence student comes in contact in a more personal way with the instructor than is often the case with the student attending large classes. Moreover, the instruction may be taken by those who are engaged in manual and mental employment and can thus be given a more practical application, especially in the matter of time. Then, too, correspondence study enables a student to employ leisure hours in a way that is at once profitable and restful. In addition to this it may be taken in the home, which in our day of outside attractions and street activities may be a great blessing.

The College of Hawaii will, during the coming year, inaugurate a system of correspondence study as a branch of its various activities. Both on account of its somewhat limited facilities at the present time and also because of its not knowing what subject prospective students in the Islands may be interested in, the number of subjects offered in the beginning will be few.

As time goes on and new demands or points of view arise on the part of students, both old and young, additional subjects may be added. The grade of instruction in these subjects will be in accordance with the ability and attainments of the students.

It is believed that by this means the College may be instrumental in not only furthering the interests of education, but also in enabling people who may not have had opportunities of attending school to receive some instruction that may be suitable to their needs.

The correspondence work has amply justified its existence, and bids fair to increase markedly from year to year.

The President's Report for 1910 contains a section reviewing the work of the Extension Department, emphasizing its importance, and looking forward to its speedy development. The College of Hawaii has as its basic principle the ideal of service and training for service. The Extension Department is one of the large avenues through which it realizes this ideal.

VAUGHAN MACCAUGHEY,
In Charge of Extension Work.

THE GREAT COFFEE CORNER.

By J. M. McCHESNEY.

Coffee reached its lowest price on November 13, 1902—No. 7 Rio selling at 5 1-16 cents per pound on that day in New York.

The crop of 1906-7 was the largest ever produced—reaching the enormous amount of nearly 24,000,000 bags.

These were the two factors which brought about the great coffee "corner," and raised the price to consumers of the breakfast cup two and a half times in six years.

In 1895 this grade (No. 7 Rio) was selling at 17 cents in New York. This high price stimulated planting in Brazil to such an extent that in seven years (by 1902) prices reached their lowest level, and bankruptcy threatened coffee growers throughout the world. The price again rose gradually till it reached 7½ cents in 1906-7, when the bumper crop of that season (nearly 24,000,000 bags of 130 pounds each) turned the scale again, and prices dropped to 5⅞ at New York in December, 1907. Since when the combine between Brazil and European capitalists, commonly called the "Valorization Scheme," has caused a slow but steady advance in prices, till in December last No. 7 Rio sold at 13½ cents in New York.

Brazil is the great coffee growing country of the world, producing on an average more than 65 per cent. of the world's consumption. Sao Paulo, a State of Brazil, produces about 60 per cent. of the Brazilian crop. One plantation in Brazil produces 250,000 bags of 130 pounds each, by actual figuring enough to furnish a cup to every man, woman and child in the United States and Canada every day for a week. Eight thousand persons live on this estate and make their living cultivating coffee. The following table will be of interest as showing the world's production, the consumption yearly, the visible supply, and the price, on July 1 annually, for twenty years past:—

	World's Visible Supply.	Price No. 7 Rio, New York.
1890	1,900,000	17 3/8
1891	2,955,020	12 7/8
1892	1,006,618	6 5/8
1893	2,146,427	10 1/2
1894	1,115,681	5 3/4
1895	1,888,000	13
1896	1,975,800	7 3/8
1897	1,435,900	5 1/4
1898	1,200,000	10 1/8
1899	1,840,560	15.16
1900	1,867,320	

1902	11,261,331	5¼
1903	11,900,173	5 3-16
1904	12,361,454	7⅛
1905	11,265,510	7¾
1906	9,636,563	8
1907	16,399,954	6¾
1908	14,126,227	6¼
1909	12,841,057	7¾
1910	13,719,530	8½
January 1, 1911	13,015,214	13½

Crop Year.	Production bags.	Consumption bags.	Production over Consumption.	Consumption over Production.
1890-1	9,323,000	8,718,661	604,339	
1892	11,979,000	10,804,551	1,174,449	
1893	11,284,000	10,946,228	357,772	
1894	9,401,000	10,571,533		1,170,533
1895	11,764,000	11,212,851	551,149	
1896	10,377,000	11,142,813		765,813
1897	13,918,000	12,244,204	1,673,796	
1898	16,058,000	14,571,902	1,486,098	
1899	13,756,000	13,480,904	275,096	
1900	13,801,000	14,972,699		1,171,699
1901	15,100,000	14,329,925	770,075	
1902	19,735,000	15,516,663	4,218,337	
1903	16,664,000	15,966,498	697,502	
1904	15,983,000	16,133,707		150,707
1905	14,448,000	16,163,353		1,715,353
1906	14,792,000	16,741,215		1,949,215
1907	23,786,000	17,544,750	6,241,250	
1908	14,834,000	17,525,418		2,691,418
1909	16,918,000	18,649,602		1,731,602
1910*	18,100,000	18,500,000		400,000

*Reports differ—not reliable.

While Brazil has steadily increased her output from 5,358,000 bags in 1890 to over 11,000,000 in 1910, that of every other coffee-growing country has decreased. It will be noted that consumption has increased close to 500,000 bags annually, while production varies much from year to year. As for instance, Brazil's crop of 1901-2 was 50 per cent. larger than the year before, and her crop of 1906-7 was nearly twice as large as that of 1905-6. In 1901-2 the world's crop was 19,735,000 bags, by far the largest up to that date. This brought the selling price down to 5 1-16. The production over consumption that year

was 4,218,000 bags. In 1906-7 the bumper crop was produced, the enormous amount of 23,786,000 bags. Production over consumption this year was 6,241,000 bags, and prices sagged to 57%. And all that kept the prices from going down to a figure that would have ruined the coffee growers even in Brazil was the so-called "Valorization Scheme" just put into effect. If these low prices continued, it meant ruin to coffee growers throughout the world. As a prominent Brazilian put it at that time, "The increase of the world's crop of 1902 was so violent it could not be accompanied by consumption, and so prices fell disastrously, and planting interests, once so prosperous, went from bad to worse, until the gigantic crop of 1906-7 threatened to swamp them altogether, and black ruin stared them in the face." Such were conditions when the government of Sao Paulo came to the rescue of the growers, and the "Valorization Scheme" was hatched, the most gigantic, far-reaching trust ever formed.

The three principal States of Brazil (the government of Brazil was not yet in the deal) now entered into an agreement whereby they assumed a pro rata responsibility for the purchase of such surplus coffee, to borrow money to carry that surplus, the same to be held until it could be marketed without crowding the price below the approved minimum. Eight million bags were purchased, and a loan of \$80,000,000 made, to be paid in stated installments. The Arbuckles, and Crossman & Sielcklen, of New York, together with some French bankers, made the advances. The Rothschilds and other leading bankers of Europe refused, considering the whole valorization program economically unsound. In December, 1906, in an interview by a reporter of the Wall Street Journal, Hermann Sielcklen, of Crossman & Bro. of New York City, the American representative of the syndicate who supplied a portion of the gold necessary to carry the load, said: "It is no scheme at all. It is simply a plain business proposition which houses representing \$250,000,000 capital can without any doubt carry through to the measure of success which is necessary to accomplish the object for which the plan was undertaken."

To those who financed the scheme it was only a "plain business proposition." It was only a matter of money and time to make it a success. In a leading coffee journal another writer at that time said: "Did you ever hear of such a crazy scheme? What would you say if Uncle Sam were to buy up the surplus wheat of the United States in order to boost the price? Well, the scheme will never work, because the stuff will always be hanging over the market and depress it, and everybody will know it is there."

After the large crop of 1902, and for a few years following, the consumption exceeded the production, and prices advanced

a little; the world's visible supply on July 1, 1904, was 12,361,000 bags, almost a year's requirements; and another crop ready to pick. Then came the record-breaking crop of 1906-7, and production was increased to 6,241,000 bags over consumption in one year. When they were expecting a 15,000,000 bag crop, they found they had 24,000,000 bags to market—Brazil's crop alone this year being 19,500,000 bags. In December, 1907, prices being still low, the American Consul-General at Rio de Janeiro wrote home: "Perhaps even now it would be an actual saving of money to the backers of the coffee syndicate, certainly to the planters, and to every one but the consumers, if this immense store of coffee were burned or thrown into the sea." (There were then some 8,000,000 bags in the hands of the syndicate, and another bumper crop in Brazil threatened.) "Although the Sao Paulo government had placed very heavy taxes on the extension of coffee plantations, and it is frequently said this will curtail the size of future crops, the effect is almost certain to prove otherwise," he said. A little later, the government of Brazil seriously proposed that the law then pending for a surtax on coffee shipped out of the country should be changed, and instead of taking a tax payable in money, the government should take one-tenth of the coffee, load it on barges, take it out to sea and sink it. Only the fear of criticism throughout the world prevented this wanton destruction of coffee. This was actually agreed to at a meeting of the committee representing the holders of the coffee in London April 26, 1909.

But many factors conspired to interfere with the success of the scheme. A new government was coming into office in Brazil. What would its attitude be? Continued overproduction was threatened. Prices were still low. It seemed that those who had predicted failure were to have their predictions realized. Something had to be done to interest further loans. At this date the *Saturday Evening Post* published the following: "Dispatches announce the utter collapse of the coffee 'corner,' at a loss to the Brazilian government of \$15,000,000."

But it was not to be. When the scheme had been in operation two years, it did not look promising, and Sao Paulo discovered she had more than she could carry. Brazil now came to the rescue of the four States which had originally undertaken to corner the crop alone, and in December, 1908, a new agreement was entered into. A new loan of 15,000,000 pounds sterling was made, the government of Brazil now guaranteeing principal and interest, and the bonds were issued for the amount. One-third of the bonds were taken in London, one-third in Paris, \$10,000,000 in New York, and the balance went to the money centers of Europe. A committee of seven was named to handle the coffee, six by the firms that furnished the money, and one by the Brazilian government. The coffee was to be shipped to the

representatives of the several firms as collateral, and the agreement provided that 500,000 bags only should be disposed of in the crop year 1909-10, 600,000 during 1910-11, 700,000 during 1911-12, 800,000 during 1912-13, and thereafter 700,000 yearly. To further help out the scheme, Brazil was to levy a surtax on all coffee shipped out of the country over 10,000,000 bags annually, of about a half cent per pound, and remit the proceeds of this tax weekly to the bondholders. It was also agreed that the government should enact a law that would prohibit the planting of additional coffee trees, and prevent as far as possible an increase in the supply. The success of the whole scheme depended on such a law, and it was done, with the result that the surplus is steadily declining, prices advancing, and consumption rapidly overtaking production. We have thus here presented the unique spectacle of a powerful government, for the first time in history, engaged in restricting by statute the production of a necessary commodity for the purpose of enhancing the price. Attempted "corners" in cotton, wheat and corn have failed in the past, but here we have a "corner" that has been a complete success. Every person who drinks a cup of coffee is contributing his mite toward the millions of profits now being reaped by the scheme.

In justification of the scheme a writer in the *Brazilian Review*, in speaking of the conditions existing in 1906-7, said: "Little by little, resources, accumulated in a decade of prosperity, were exhausted, and planters went down one by one into obscurity. Laborers were left unpaid, and emigrated in swarms. Banks broke, and even the great Bank of the Republic was forced for a while to suspend payments. So when the bumper crop of 1906-7 came, the cup of the planters' bitterness was full to overflowing."

On January 1 last the syndicate had on hand 6,310,323 bags coffee, of which 1,461,890 were stored in New York, the balance in European warehouses. This coffee is a much higher grade than No. 7 Rio. This coffee represents at present prices a value of 20,000,000 pounds sterling, while the obligation of Brazil to the syndicate, according to official figures, is but 13,000,000 pounds at the same time. While this difference does not represent the entire advanced cost to the consumers, it probably does represent the net profits to Brazil on the amount purchased by the syndicate.

What has the syndicate gained by the "corner" what she failed to get by the purchase of the coffee?

The price of coffee in the markets of the world has advanced two and a half times since the scheme was inaugurated. Will it stop? If coffee can be controlled now by capital (and it certainly is and pretty effectually), will this control be surrendered later on when all the coffee is sold? It is believed that restriction on new planting is being effectually

carried out by the Brazilian government, so it is improbable that the production will soon again overtake consumption to such an extent as to force down prices very materially. Will the United States, the great coffee drinking nation of the world, remain inactive while this is going on? The matter has already been brought to the attention of Congress by the introduction of a resolution of inquiry by Representative Norris of Nebraska. The department having charge of the resolution will probably report in December when Congress convenes. The United States is in a position to force Brazil by placing a heavy duty on Brazilian products in retaliation.

Of course, in Brazil, they do not call it a "trust" or "combine." There it is "a company organized to sell state-owned coffee." The State is merely a dealer. The total advances made to the government for the purpose of buying coffee were \$111,470,530 reduced to U. S. dollars. The State Secretary of Sao Paulo, referring to the conditions in December last, said: "The coffee situation is now solid and not easily upset, and will so continue indefinitely, provided the public authority is vigilant to see that the conditions leading up to the crisis, which we have left behind, are not repeated." (Meaning probably over-production.) "As to the liquidation of the compromises assumed by the State, it may be affirmed that within two or three years they will all be paid off, leaving a considerable balance."

In the meantime, it will be a good move on the part of Hawaii to plant coffee. A period of high prices is sure to prevail. Like the sugar trust, it looks like this great international coffee trust is to remain with us.

UNRECORDED SPECIMENS OF TWO RARE HAWAIIAN BIRDS.

By OUTRAM BANGS.

From the Proceedings of the Biological Society of Washington.
D. C., Vol. XXII, pp. 67-70.

May, 4, 1910.

Lately while arranging the skins of *Acrulocercus nobilis* in the Museum of Comparative Zoology I discovered among them a fine example of the long ago extinct *Acrulocercus apicalis* (Gould) of Oahu Island.

This specimen came to the museum in exchange from Brown University, and had formerly belonged to John Cassin. It bears a label in Cassin's hand with the inscription, "Sandwich isld. J. K. Townsend male," and was without doubt collected by Townsend during his visit to Oahu in 1835. The skin, No. 17,598, Museum of Comparative Zoology, is that of a fine adult

male, and, although made seventy-five years ago, is in perfect preservation, except that its feet and legs have, at some time, been somewhat eaten by insects.

Wilson and Evans in their *Aves Hawaiiensis*, 1890-1899 (p. "103"—the work is not paged) mention five specimens, all that were known to them, of *A. apicalis*—three in the British Museum, one of which went by exchange to Rothschild's Tring Museum, and a pair collected by Deppe which are in Vienna.

Rothschild's *Extinct Birds*, 1907, p. 27, enumerates the same five specimens, but says that Deppe's skins are in Berlin.

Ours makes the sixth known example of *A. apicalis*, which is believed to have been confined to Oahu, and which has not been seen alive by a naturalist since 1837.

It is the only one in America, Dr. Chas. W. Richmond informing me that the United States National Museum does not possess any, and Mr. Witmer Stone says that there is none in the Academy of Natural Sciences in Philadelphia, although that institution had most of Cassin's Collection of birds.

In the Museum of Comparative Zoology there is also a fine pair of *Ciridops anna* (Dole), one of the very rarest of Hawaiian birds and certainly one of the most beautiful.

The exact origin of these skins, of excellent make and in perfect preservation, I have been unable to learn. They came to the museum with a few other Hawaiian birds—six skins of *Acrulocercus nobilis* and several petrels and terns—and were catalogued by Dr. J. A. Allen in 1870; names for none but the Moheo being written on the labels or in the register by that naturalist.

Ciridops anna was described by Judge Dole in 1879, and is supposed to be, or perhaps better to have been, confined to the Island of Hawaii. It was, until I unearthed our two skins, known by three male specimens only, one now in the Bishop Museum and two in Rothschild's Museum at Tring. The female and young male were unknown.

Our male, No. 10,995, is in full plumage, and very closely matches the exquisite plate in Wilson and Evans, *Aves Hawaiiensis*.

Our other specimen, No. 10,987, I take to be an adult female. Though a little smaller, it is exactly similar in proportions to the male, but is wholly different in color. It may be described as follows:—

Forehead clothed in stiffened, pointed, semi-erect feathers as in the adult male. Top of head, nape, and sides of head cinnamon washed with dull olive-yellow on forehead and with the lores and a narrow frontal band more dusky; cheeks with paler shaft-stripes to the feathers; lower back grayish cinnamon, gradually passing into the purer color of the head; rump and upper tail coverts olive-yellow; tail dusky, fringed with olive-yellow; primaries blackish, narrowly edged with dark olive-

yellow; secondaries more broadly edged with the same, the innermost nearly wholly dark olive-yellow; throat dull cinnamon, the feathers with paler shaft stripes, slightly washed with yellow-olive in lower middle; chest and breast dingy-smoke-gray, somewhat washed with olive, gradually passing into dark olive-yellow on belly; under wing coverts, axillars, under tail coverts and a small patch in lower middle belly dilute rufous-cinnamon. The general pattern thus resembles that of the adult male, though the colors themselves are very different. Our two skins afford the following measurements (in mm.):—

<i>No.</i>	<i>Sex.</i>	<i>Wing.</i>	<i>Tail.</i>	<i>Tarsus.</i>	<i>Culmen.</i>
	♂				
10995	(♂ ad.)	80	44	22	11
10987	(♀ ad.)	73.5	41	21	10

WORK OF THE DEPARTMENT OF AGRICULTURE ON BEE DISEASES.

Washington, D. C., December 6, 1910.

The honey bee annually produces a crop of honey valued at at least \$20,000,000, and there are vast opportunities for increasing this output. The most serious handicap to bee-keeping in the United States is the fact that there are contagious diseases which attack the brood of the honey bee. There are now recognized two such diseases, known as American foul brood and European foul brood. From data recently obtained by the United States Department of Agriculture, it is known that American foul brood exists in 282 counties in thirty-seven States, and European foul brood in 160 counties in twenty-four States, and it is estimated conservatively that these diseases are causing a loss to the beekeepers of the United States of at least \$1,000,000 annually. This estimate is based on the probable value of the colonies which die, and the approximate loss of crop due to the weakened condition of disease colonies. The State in which the diseases are most prevalent are California, Colorado, Illinois, Indiana, Iowa, Kansas, Michigan, Missouri, Nebraska, New Jersey, New York, Ohio, Pennsylvania, Texas, and Wisconsin, and it is unfortunate that these are the States in which honey production is most profitable, making the future outlook of the bee-keeping industry so much the worse unless active measures are taken to control the diseases. Furthermore, the distribution of these diseases is by no means fully known, and they are constantly spreading.

The cause of American foul brood has been found by the Department to be a specific bacterium, and enough is known of the cause and nature of European foul brood, which is also

a bacterial disease, to make it possible to issue reliable recommendations concerning treatment for both diseases. Both attack the developing brood, and as the adult bees die from old age or other causes, the colony becomes depleted since there are not enough young bees emerging to keep up the numbers. When the colony becomes weak, bees from other colonies enter to rob the honey, and the infection is spread.

Both of these diseases can be controlled with comparative ease by the progressive beekeeper, but the chief difficulty encountered in combating these diseases is the fact that the majority of the beekeepers are unaware that any such diseases exist; they therefore often attribute their losses to other sources, and nothing is done to prevent the spread of the infection. It is therefore necessary in most cases to point out the existence and nature of the diseases, as well as to spread information concerning the best methods of treatment. Several States have passed laws providing for the inspection of apiaries for disease, and the beekeepers in other States are asking for the same protection, so that careless or ignorant beekeepers can be prevented from endangering their neighbor's bees. This inspection is a benefit in so far as the inspectors can cover the territory. The Department of Agriculture is helping in this work by sending out publications to the beekeepers in infected regions, by examining samples of brood suspected of disease, and by sending out information concerning the presence of disease, so that beekeepers will be informed that their apiaries are in danger. The co-operation of agricultural colleges, State Beekeepers' Associations, and other similar agencies is being urged.

In view of the fact that these diseases are so widespread, every person interested in beekeeping should find out as soon as possible how to recognize and treat these maladies, and be on the lookout for them. A publication containing a discussion of the nature of these diseases and their treatment will be sent on request to the Department of Agriculture.

BOARD OF AGRICULTURE AND FORESTRY.

Division of Forestry.

ROUTINE REPORT.

Honolulu, June 8, 1911.

The Board of Commissioners of Agriculture and Forestry,
Honolulu, Oahu.

Gentlemen:—I have the honor to submit as follows the regular report of the work of the Division of Forestry for the month of May, 1911.

My own time during this month has largely been occupied with routine duties in connection with preparing plans for proposed forest planting in the Koolau District, Maui, and with arranging details regarding the experimental tree planting now in progress in this Territory under Federal funds; in attending to matters of detail in the office, and in preparing and revising, for the use of the Board, statements in regard to the reallocation of the Board's appropriation for the coming fiscal period.

Mr. Curran's Visit.

Mr. H. M. Curran, of the Philippine Forest Service, who stopped over for a month as a temporary member of the staff of the Division of Forestry, left Honolulu on May 14 en route to Manila. Under the date of May 12, Mr. Curran submitted to the Board a report outlining his opinion on the problem of replacing the forest in the portions of the Koolau Forest Reserve, Maui, where the original forest was killed some years ago.

Federal Tree Planting.

In the Federal tree planting work several thousand seedling trees, both of Conifers and of several species of Eucalypts, were planted out in the experimental plots on the slopes of Haleakala, Maui, during the months of April and May.

During May, also, several acres of ground in Nuuanu Valley above Luakaha, were put in shape for the planting of experimental plots of some twenty odd species of Eucalypts. The idea is to establish a half acre each of all the more important species, so that data can be got as to the stability of the several kinds for local use, more particularly those new to the Territory. The seedlings for this planting are now ready at the Makiki Station. The little trees will be set out during June.

Other Forest Planting.

The forest planting on the Kohala mountain, begun in April, is reported to be getting on satisfactorily. Provision for continuing this project was made in its reallocation of the conservation tax fund by the Apportionment Board.

Other work in connection with tree growing and distribution is described in the report of the Forest Nurseryman, submitted herewith.

Eucalyptus Bulletin.

Following a call for tenders, a contract has been awarded the Hawaiian Gazette Company for printing Mr. Louis Margolin's bulletin entitled "Eucalyptus Culture in Hawaii." The manuscript of this report, approved by the Forest Service, was re-

ceived after much delay late in April. The bulletin should be out about July 1. It should prove of more than usual interest to tree planters in Hawaii.

South Kona Forest Reserve.

On May 17, Governor Frear signed the proclamation creating the South Kona Forest Reserve, which project had been temporarily held up until a change could be made in the technical description of the boundary. The total area of this reserve is 36,952 acres, of which 29,260 acres is government land.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

ROUTINE REPORT.

Honolulu, July 1, 1911.

The Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for June, 1911.

Eucalyptus Bulletin.

Owing to the readjustment of the Board's financial matters, the manuscript of Mr. Louis Margolin's bulletin, "Eucalyptus Culture in Hawaii," had temporarily to be withheld from the printer early in the month; otherwise the bulletin would have been out by this time. The report is now in press and will appear early in July.

Federal Tree-Planting in Nuuanu Valley.

During the month there have been planted out in Nuuanu Valley above Luakaha, experimental lots of a number of species of Eucalypts, mostly new to the Territory. Plots, some of one-half, some of one-third acre each, have been laid out for some twenty odd species. About half of the seedlings have been planted; the remainder will be set out in July. The cost of this work was borne by the Forest Service of the U. S. Department of Agriculture out of its allotment for Experimental Planting in Hawaii. The object of the experiment is to help to determine which species of Eucalypts are best adapted for use in these islands.

Forest Fire Service.

On June 12, and again on June 18, forest fires were reported from the Koolau District, Kauai, on lands mauka of the Kilauea Sugar Plantation Company. These fires were both put out by plantation laborers acting under the direction of Mr. J. R. Myers, manager of the plantation and district fire warden. Something over one hundred acres were burned over. Efforts are being made to apprehend the persons supposed to have started the fires.

In order more efficiently to cover the Ewa District, Oahu, additional district fire wardens have been appointed, as follows: Mr. H. C. Dolliver, for the section between the land of Manana and the Kaukonahua Gulch; Mr. James Gibb, for the lands from Moanalua to Waiawa. For Palolo Valley, Oahu, Mr. Samuel R. Stone, and for the Districts of Honuaula and Kahikinui, Maui, Mr. Alike Dowsett.

Forest Reserves.

Following a public hearing held on June 28, Governor Frear, on June 29, signed a proclamation setting apart 19,850 acres of government land in the District of Puna, Island of Hawaii, as the Puna Forest Reserve. This reserve includes the section of ohia forest now being logged under a timber license held by the Hawaiian Development Company. The land having been set apart as a forest reserve, a payment of \$2,955.00, due from that company for timber already cut, will be paid over to this Board to form a special fund expendable for forest purposes. This is the first instance where the section of the forest reserve law relating to revenue from forest reserves has become operative.

During June an arrangement was consummated between the government and Mr. Eben P. Low, lessee of the Island of Kahoolawe, whereby in consideration of the remission of unpaid rents, Mr. Low agrees to kill off all the goats on the island and remove all of his remaining sheep during this calendar year. Kahoolawe has been set apart as a forest reserve in order that this Board may undertake systematic steps towards its reclamation. The present action permits this work to be begun a year sooner than would otherwise be possible.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF THE FOREST NURSERYMAN.

Honolulu, July 1, 1911.

Distribution of Plants for June.

	In seed boxes.	In boxes transplanted.	Pot grown.	Total.
Gratis	7000	1300	750	9050
Sold		400	89	489
	<hr/> 7000	<hr/> 1700	<hr/> 839	<hr/> 9539

Collections for June amounted to \$33.30 on account of plants and seed sold.

Collecting of Seed.

The *Grevillea robusta* and also most of the Eucalypts are now in season, and the two men are kept busy collecting and sorting. Some of the seed is quite difficult to collect and requires to be watched carefully. The *Grevillea robusta*, for instance, must be collected just before the seed pods begin to open; if left too long the pods will crack open and the seed get lost. Then again, should the pods be picked too soon, the seed will not be good. The same rule applies to a number of different species, and great care is required so that the best seed may be procured.

DIVISION OF ENTOMOLOGY .

Honolulu, June 30, 1911.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen:—I herewith respectfully submit my report of the work of the Division of Entomology for the month of June.

During this month we boarded 26 vessels and we found fruit, vegetables and plants on 16 of them.

The usual careful inspection was made of all the shipments with the following result:

<i>Disposal with principal causes:</i>	<i>Lots</i>	<i>Parcels.</i>
Passed as free from pests	676	9416
Returned	4	25
Burned	34	64
Fumigated	14	17
	<hr/>	<hr/>
Total inspected	728	9522

Rice Shipments.

Thirty-four thousand four hundred and ninety-five bags of rice arrived during the month, a large increase over last month's shipments, and each consignment was carefully inspected and found free from weevils and other pests.

Pests Intercepted.

Quite a number of small plant shipments were received during the month and a number of Australian lemons and apples, as well as a piece of sugar cane from Suva, Fiji, were taken from passengers. On orchids from England we found scale insects (*Diaspis boisduvali*). On Camellias from Sydney we found *Thrips species*. On Pine tree from Japan we found some plant bugs, a *Capsus species*, and on the lemons from Sydney we found two scale insects, *Chrysomphalus biformis* and *Chionaspis permutans*. Twenty-five boxes of lemons infested with several scale insects coming from California were returned to the shipper.

Brother M. Newell, Inspector at Hilo, reports the arrival of five steamers and two sailing vessels, of which three steamers brought vegetable matter consisting of 72 lots and 658 parcels, all of which was found free from pests.

Beneficial Insects.

During the month one colony of *Vedalia* was sent to Molokai and a large colony in all stages in a breeding cage to Midway Island, as the last shipment, owing to delay, arrived in bad condition. Four lots of Japanese beetle fungus was distributed.

I received a lot of pupae of the California Oak Moth (*Phryganidia californica*), which contained parasites of caterpillars. Unfortunately the lot did not yield many parasites, but those which issued were liberated. Last season this same parasite, *Pimpla behrensii*, was liberated in large quantities among the cocoanut groves for the purposes of attacking the cocoanut leaf roller.

Interisland Inspection.

Everything is in readiness now to start a thorough inspection between Oahu and the other islands. Since the Governor signed Rule IX, I have selected my inspectors, Messrs. Arthur E. Carter and Edward Drew, who will begin their duties on July 1st. Printed notices to passengers will be handed them when purchasing their tickets, and tags for shipment of plants are in readiness. Large notices in English, Portuguese, Hawaiian, and Japanese have been printed and will be placed in conspicuous places on the dock.

Respectfully yours,

• EDW. M. EHRHORN,
Superintendent of Entomology.

FOREST FIRE WARDENS.

The following appointments have recently been made by the Board of Commissioners of Agriculture and Forestry:

District Forester.

G. O. Cooper, in and for the District of Hana, Island of Ma

District Fire Wardens.

Alexander Smith, in and for that portion of the District Hamakua, Island of Hawaii, extending from the western boundary of the land of Paauhau to the land of Kukaiau.

Alika Dowsett, in and for the District of Honuaula and Ka kinui, Island of Maui.

A. Menefoglio, in and for Wainiha Valley, District of Halea, Island of Kauai.

Byron O. Clark, in and for Manoa Valley, District of Koolahou, Island of Oahu.

H. C. Dolliver, in and for that portion of the Ewa District, Island of Oahu, lying to the east of the main government road between the northern boundary of the land of Manana and the Kaukonahua Gulch.

James Gibb, in and for that portion of the Ewa District, Island of Oahu, lying between the lands of Moanalua and Waiawa.

Sam R. Stone, in and for Palolo Valley, Island of Oahu.

Walter F. Dillingham, in and for that portion of the Ewa District, Island of Oahu, lying to the west of the main government road.

FORESTRY IN OUR COUNTRY SCHOOLS.

(By O. E. HUSE, '12, School of Agriculture of the Pennsylvania State College in *Penn State Farmer* for May, 1911.)

Educators, at the present time, are beginning to make a more practical application of the subjects taught in our schools and colleges. So in considering the question of, how much forestry should be taught in our country schools, we must first consider the question of, how much use do the pupils in our country schools make of trees? The extent to which trees are used, of course with local conditions, but we can find a number of general uses and common ones in our country communities.

The boy in the country school, for example, learns a lesson in forestry when he begins to teach him the difference between a sapling and an arrow, and the difference between a

the trees with the least amount of damage, and some of the most prominent characteristics of trees. His acquaintance with the birch may begin still younger, mine did, and I can tell that tree anywhere today, because of the close acquaintance I had with it in my youth. Nut and acorn trees, the boy knows in a general way because of the fruit which they bear, but by building upon his knowledge of and interest in the trees because of their fruits he may be taught their other characteristics, their commercial value and habits of growth. The sugar maple is distinguished because of the quality of its sap, and here again is a basis upon which I built a knowledge of all the maples.

Much of the damage done to nut and other trees by the boy is done through ignorance and carelessness. If he were taught more about trees, their seeding and growing habits, the injury caused by making wounds in the bark; if he could set out and raise some trees that he would feel were his own, the trees would become such close friends of his that he would come to be their natural protector.

Again, a few visits with proper instruction to where a house is being built, a fence being put up, a wagon in the course of construction, also a trip to the neighboring sawmill would give him very valuable lessons in the uses of wood.

The problem at once arises as to who will teach the boys these various things since the average country school teacher is not prepared for this work. There are several ways out the difficulty. The teacher may become informed by study with the aid of the State and National Forestry Bureau. Excellent bulletins, dealing with the teaching of forestry in country schools may be obtained from the Department of Forestry at Washington, D. C. The teacher may receive some practical help from carpenters, carriage manufacturers and mill foremen. Undoubtedly the demand for such subjects will force the normal school to offer instruction along this line in the near future. The normal school is the place where teachers should be prepared for this work. Meanwhile, we have our summer schools, such as the one at The Pennsylvania State College, where teachers may receive excellent training in the teaching of forestry.

This article is not intended as a finished discussion of the teaching of forestry in our country schools, but only as suggestive of a way in which the country boy may get a little more out of his school experience by becoming better acquainted with his surroundings. Thus will be found life in the country more valuable and more attractive.

WEED DESTRUCTION IN THE PHILIPPINES.

From an article in the *Philippine Agricultural Review*, for February, 1911, it appears that the Plant *Lantana Camara*, which is one of those known as "wild sage" in the West Indies, has

been introduced, together with other tropical American weeds and ornamental plants, into the island of Negros, in the Philippines. This plant, by its rapid spread and luxuriant growth, has already caused trouble to agriculturists in Hawaii, where insect pests have been introduced for the purpose of diminishing its spread.

The measures that are proposed for the eradication of the weed before it becomes disseminated beyond control consists in the process of loosening the root system, which is very weak, by means of a pick or a strong wooden stake, and then cutting through the roots just below the collar; the plants treated in this way are allowed to become dry in the sun, and are then burned as soon as they are fit for this to be done.

The article draws attention to the characteristic inflorescence of the plant, which consists of a small bunch of reddish or yellowish flowers, borne near the tips of the branches; the flowers in the center of the bunch open first, when their color is pinkish or yellowish, but reddish or purplish after a few days. The most potent circumstance in the spread of the plant is the fact that the fruits are eagerly eaten by birds, which do not, however, digest the seeds.

As is well known, the plant is a perennial, and attains in the West Indies a height of 5 to 7 feet. In Hawaii, it has been known to grow as tall as 15 feet, but the specimens in Negros were only 6 to 9 feet high, at the time of publication.—Agricultural News.

RESISTANCE OF PLANTS TO WIND—A COTTON PEST.

The *Bulletin Agricole*, of Mauritius, for February, 1911, has an interesting note on the effects, on various plants, of the hurricane that visited the island at the beginning of that month. It states that cocoanut palms showed a useful power of resistance to the wind, while the tamarind trees, although they had attained their full leafage, merely suffered a scorching of the leaves and soon sprouted again. In an area where much harm was done to plants of every kind, several acres of cotton were completely destroyed, though generally this plant exhibited reasonable behavior under the trying conditions: the wind scorched the leaves, but new buds quickly opened; the position in regard to cotton is summarized by saying that this plant has proved its possession of a power of resistance to high winds.

The note, it may be stated also, has reference to a large snail which is a pest of cotton in Mauritius. This, according to information contained in a letter from Mr. J. H. Lee, who is in Mauritius on behalf of the British Cotton Growing Association, is *Achatina fulica*. In regard to this animal, it is of interest that

an outbreak of the pest took place in Ceylon, in 1910; this is described in *Circulars and Agricultural Journal of the Royal Botanic Gardens, Ceylon*, Vol. V, No. 7, where, however, it has shown itself a scavenger rather than an enemy of plant life.—Agricultural News.

BRACER FOR RUBBER.

Tropical Life (London) for May, in its review of the rubber shares market, discusses a conflict between bulls and bears with regard to the price of Para, and then goes on to brace up the spirits of rubber investors in the following words:

"The outlook, then, is one of uncertainty; but this consumers' hand-to-mouth policy of buying only for immediate needs is becoming dangerous, and must be very hampering and nerve-racking, as in previous years it was the unquestioned policy to hold a fair margin of stock for future demands. These demands are going to be big. The motor industry is swallowing rubber with enormous rapidity, and its appetite grows with eating.

"The holidays at the beginning of May, in conjunction with a large measure of uncertainty as to the course of the material market, has brought business in rubber shares to a comparatively low ebb. Meanwhile, the tide of prosperity in the rubber industry flows steadily on; proof of this being clearly shown by the large number of excellent reports now coming to hand. It is the nature of these reports—demonstrating as they do the big dividend-earning capacity of well-placed, well-managed estates—that makes one feel that the rubber industry is not a 'fairy's whim,' but a sensible, solid, business-like undertaking of lasting merit. Reading the annual reports now appearing day by day, it is very noticeable how many of the comparatively young companies are entering the ranks of the dividend payers for the first time, with the prospect of largely increased distributions at this time next year."

PUNA FOREST RESERVE.

Following a public hearing held on June 28, 1911, by the Governor of the Territory and the Board of Commissioners of Agriculture and Forestry, Governor Frear, on June 29, signed a proclamation setting apart 19,850 acres of government forest land in the District of Puna, Island of Hawaii, as a forest reserve. This proclamation is given on another page of this issue of the Forester. The report of the Superintendent of Forestry on this subject, approved by the Board of Agriculture and Forestry at a meeting held on June 9, 1911, was printed in the June number of the Forester.

PROCLAMATION OF THE FOREST RESERVE IN THE DISTRICT OF PUNA, ISLAND AND COUNTY OF HAWAII.

Under and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I, WALTER F. FREAR, Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said acts provided, do hereby SET APART as a Forest Reserve to be called the "PUNA FOREST RESERVE," those certain pieces of government land in the District of Puna, Island of Hawaii, which may be described roughly as being the section of forest lying mauka of the Kaohe Homesteads above Pahoa, and containing an area of 19,850 acres, more or less, in the District of Puna, Island and County of Hawaii, Territory of Hawaii, more particularly described by and on a map made in June, 1911, by the Government Survey Department of the Territory of Hawaii, which said map is now on file in the said Survey Department marked Government Survey Registered Map No. 2060 and Puna Forest Reserve, and a description accompanying the same numbered C. S. F. 2248, which said description now on file in the said Survey Department, is as follows:

PUNA FOREST RESERVE.

Including portions of the Government lands of Makuu-Kaohe, Kaimu-Kehena and Kapaahu-Kamaili, Puna District, Island of Hawaii.

Beginning at a + marked on the lava under a mound of stones at North edge of the ancient cultivated grounds of Oliolimanienie, this point being the extreme West or mauka angle of Waikahekahenui as also of Waikahekaheiki, the common boundary point of these two lands with Makuu, the coordinates of said + referred to Government Survey Trig. Station "Olaa" being 37,071.0 feet South and 9,831.0 feet East, as shown on Government Survey Registered Map No. 2060, and running by true azimuths:

1. 332° 36' 30770.0 feet across the Makuu-Kaohe Government Tract to the West corner of Lot 1 of the Kaimu Homesteads (Thrum's Subdivision), from which point Government Survey Trig. Station "Heiheiiahulu" (old) is by true azimuths 138° 02' 30";
- " " 5710.0 feet along Kaimu Government remainder to the North corner of Lot 4 of the Kapaka-Kauka Homesteads;
- " " 177.0 feet along said lot to the West corner of said lot;
- " " 1830.0 feet along Kaimu Government remainder to the North corner of Lot 1 of the Kapaka-Kauka Homesteads;
- " " 150.0 feet along Lots 1 and 2 of the Kapaka-Kauka Homesteads to the West corner of said Lot 2;
- " " 9440.0 feet along Kalapana-Kapaahu Government remainder to a point on the boundary of the land of Kahaualea;
- " " 4100.0 feet along land of Kahaualea to a place called Kalaeolomea and Ohia marked "Z";
- " " 8150.0 feet along land of Kahaualea to an ohia tree on top a sharp hill about 50 feet high the North side of which is perpendicular; marked "K" which bears 214° 00' about 300.0 feet from Kalahua Hill;
- " " 2490.0 feet along land of Kahaualea to the boundary of

10. Thence along the land of Keaau to the point of beginning, the approximate azimuth and distance being $239^{\circ} 50' 36400.0$ feet;
Area 19,850 Acres.

(Seal) In Witness whereof, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.

Done at the Capitol in Honolulu this 29th day of June, A. D. 1911.

W. F. FREAR,
Governor of Hawaii.



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AUGUST, 1911

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications **SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.**

EDW. M. EHREHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

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LOOKING TO THE FUTURE.

In the July number an advance notice was given to the bulletin of the Division of Forestry on "Eucalyptus Culture in Hawaii," by Louis Margolin, forest examiner of the U. S. Department of Agriculture. While public opinion may not be prepared to support a proposition of making eucalypts a leading choice for extensive tree planting, either by private or government enterprise, there must be unanimous assent to the general remarks of Mr. Margolin, at the beginning of his treatise, on the "Need of Local Timber Supply." They should be turned to practical account by every landowner in the islands. Every tree of commercial value for which space can be spared will enhance the value of the land upon which it stands long before the time when it shall become mature for market purposes or for utilizing its material upon the farm or ranch where grown. It will increase in intrinsic worth until ready for the axe like a bond on which the coupons are left intact until the day of redemption. As the bulletin will necessarily have a somewhat selected circulation, the remarks to which reference is made are here reproduced:

"The Territory of Hawaii, with its extensive sugar plantations, camps, flumes, tunnels, and irrigation ditches, uses large quantities of timber and lumber. No complete statistics on this subject are available, but the following figures may be considered as quite conservative. There were during the last three or four years used annually in Hawaii over forty million board feet of sawed lumber and timber, 75,000 cords of firewood, 20,000 to 25,000 railroad ties, 25,000,000 shingles and 40,000 to 50,000 fence posts. This annual consumption of wood represents a value to the consumer of at least one and one-half million dollars. With the more intensive development of the plantations, the increase in population, the development of irrigation systems, homesteads, and small farming, and the further extension of roads and power lines, the consumption of lumber will constantly increase. The problem of finding an adequate source of supply of wood becomes, therefore, of paramount importance to the future growth of the country.

"The native Hawaiian forest is entirely inadequate to meet the demand for lumber consumed in the Territory. Although the

Islands have an extremely rich and varied flora, there are few native trees of commercial value. Few native trees average more than 10 to 12 inches in diameter or more than 50 feet in height, and the clear merchantable length of such trees is too small to be of any practical use for lumber. A dozen or more different species of native trees are used locally for various purposes, but the ohia lehua (*Metrosideros polymorpha*) and the koa (*Acacia koa*) are the only two timber trees in the Territory which, because of their size and abundance, have any commercial importance. Of these two species, koa is primarily a cabinet wood, leaving ohia lehua as the only all-around native timber tree; and there is not enough of this tree to affect the situation materially. With few exceptions the chief use of the native forests is to conserve the water supply and regulate the stream flow, and their importance as a source of timber supply, except in a few restricted districts, is entirely negligible.

"The timber supply of the continental United States at the present rate of consumption can not last for a long time. As the supply of timber diminishes, export lumber from the United States may be expected to reach practically prohibitive prices for many uses. The trees native to the continental United States are all of comparatively slow growth. The more valuable pines and hardwoods require not less than 75 to 100 years to form trees big enough for lumber. It takes at least 30 to 35 years to grow tie timber, and even this rate of growth is restricted to only a few species. The rapid-growing Eucalyptus can be grown in the continental United States on only comparatively small areas in central and southern California, Arizona, southern Texas, and southern Florida.

"The Territory of Hawaii can not, therefore, depend indefinitely on the rest of the United States for its supply of lumber. Neither can it depend to any large extent on foreign countries. On the contrary, located as the islands are, and with a climate favorable to rapid growth, Hawaii, in course of time, should be able to export to the United States an ever-increasing supply of hardwood.

"Fuel wood of a low grade can be grown in Hawaii in five or six years, but trees of this age have very little value. Trees suitable for fence posts, railroad ties, and lumber, as well as for the better grades of firewood, require a much longer period to mature. Even the more rapid-growing species of eucalyptus and ironwoods, although growing faster than most hardwoods, require a number of years to reach a size which renders them fit for use as timber trees. The mistake in the past has been that trees were cut which were too young. Systematic tree planting in Hawaii can not, therefore, begin too soon, for the earlier the forests are established the less hardship will be experienced when the supply of timber becomes less abundant.

"In short, an increasing supply of inexpensive lumber is essential to the proper growth and development of the Hawaiian

Islands. The native forests are entirely inadequate both in extent and character to furnish this supply. The continental United States is approaching a time when it will be no longer in a position to export cheap lumber to Hawaii. The Islands can grow their own lumber supply before the timber scarcity comes, provided immediate planting is done on a commercial scale."

What our Washington correspondent says about the lemon tariff ought to furnish an argument in favor of an equitable degree of protection for American coffee. Free coffee is little different from the actual subsidizing of the coffee industry of Brazil, and anyone familiar with the practice of the grocery trade knows that coffee is used like trading stamps to fertilize general business, so that no one probably thinks seriously that a small duty on coffee would materially, if at all, make the breakfast table dearer. Mr. McChesney's article in the July number gave a good insight into the advantage Brazil takes of the defenseless condition of the American coffee producer. Properly encouraged, Hawaii and Porto Rico could supply the country with at least a very large proportion of the best qualities of coffee which the home consumption demands.

That it was really a great work that a majority of the former Board of Supervisors accomplished when they passed the milk ordinance now in force, after having had a previous draft bill successfully vetoed with the aid of legal talent hired by a group of dairymen, following up this victory over ignorance, prejudice and hired forensics by gaining the willing cooperation of the Board of Agriculture and Forestry and voting all the funds requested for the Territorial veterinary services required, is amply demonstrated by the comprehensive report of results made by Dr. Norgaard which is printed in this number. It is gratifying to know that the three public boards mentioned in the report are still cooperating in the cause of pure and wholesome milk as well as the welfare of the dairy industry itself.

In its June number the *Tropical Agriculturist* quotes from the *Indian Trade Journal* a portion of the bulletin on "Peanuts in Hawaii" of the Hawaii Experiment Station.

An article from the *Philippine Agriculturist and Forester* for January on "Activities of the Hawaii Agricultural Experiment Station" is being serially reprinted by the *Tropical Agriculturist* (Ceylon). It says in opening that the government of the Dutch East Indies must be given the honor of having maintained the most advanced activity in tropical agriculture, but a little farther on asserts, "But the most foremost rival of Java today is Hawaii."

forest land, starting on a flat topped ridge between the Helemanu and Opaaula gulches and burning down a little way into the forested gulches on either side. From the evidence obtainable the fire had apparently been started from a lighted match or cigarette stub thrown thoughtlessly into the dry grass by one of a squad of cavalymen, who were making a reconnoissance survey. The fire started near a camp of a detachment of the Engineer Corps. These men turned out and fought the fire, checking its spread on the ridge. A heavy dew at night fortunately prevented its further advance, the fire stopping just at the edge of the heavy woods in the gulch. A good many young trees on the flat were killed by the fire in the grass. A number of logs were finally extinguished on the 25th by laborers sent up from the Waialua plantation.

Since the 25th three more grass fires have been reported from Wahiawa, all apparently caused by the carelessness of smokers in dropping fire into a bed of dry grass. It is the opinion of the men on the ground that soldiers are to blame for most of these recent fires.

On July 26, smoke from a fire for burning brush at the mountain house of Mrs. Edward Damon caused an alarm to be given that a forest fire had started on the ridge above Moanalua. After considerable telephoning and a trip to Moanalua it was found out that no danger was to be apprehended.

PROSPECTIVE TREE PLANTING.

From a number of sources come reports that arrangements are being made on the part of plantation and ranch interests to do extensive tree planting during the winter months of 1911-12. At the government nursery considerable lots of ironwoods have been started to supply the probable demand later in the year. A little later a good supply of eucalyptus seedlings will also be got ready. But persons or corporations desiring to obtain trees from the government nursery in large numbers would do well to file their applications at once.

Very truly yours,

WALTER H. BLOOMER
Superintendent of Forestry.

THE NURSERY REPORT.

Honolulu, July 31, 1911.

R. S. Hosmer, Esq., Superintendent of Forestry, Honolulu, T. H.

Dear Sir:—The principal work done during the month of July is as follows:

NURSERY.

Distribution of Plants.

	In seed boxes	In boxes transplanted	Pot grown	Total
Gratis	10,000	1,200	288	11,488
Sold . . . . .	.....	....	130	130
	<hr/> 10,000	<hr/> 1,200	<hr/> 418	<hr/> 11,618

Collections for July amounted to \$3010.15, \$55.15 of which was on account of plants and seed sold and \$2955 on account of "Preservation, Extension, etc., Forestry and Forest Reserves (see sec. 385, R. L.)," payment for timber cut in Puna, Hawaii, by the Hawaiian Development Company, under logging license January 10, 1910.

COLLECTION OF SEED.

The collecting of *Grevillea robusta*, also species of the Eucalyptus and Casuarina, has constituted the principal work during the month.

EXPERIMENT GARDEN, MAKIKI.

The two men were employed in the following work: Transplanting seedlings, mixing and sterilizing soil, etc.

U. S. EXPERIMENTAL PLANTING IN NUUANU VALLEY.

Since the beginning of the month one man has been employed, his work being planting and hoeing. A portable tool shed and shelter hut was built in sections at the nursery and it has been placed near the middle of the tract to be planted. This hut will serve for a tool shed and also a shelter for the men during heavy rains.

Seven half-acre and two third-acre plots have been planted with the following trees, each plot containing one species:

Half-acre plots—*Eucalyptus corynocalyx* planted, *Eucalyptus microtheca* planted, *Eucalyptus gonicalyx* planted, *Eucalyptus melanophloia* planted, *Eucalyptus Smithii* planted, *Eucalyptus leucoxydon* planted, *Eucalyptus tereticornis* planted; also one plot partly planted with *Eucalyptus pilularis*.

Third-acre plots—*Eucalyptus crebra* planted, *Eucalyptus loxophelba* planted.

The assistance of the men from the nursery and Makiki station was given for six days. This was done for the purpose of paying back labor which the Federal men did in assisting us during the early part of the year.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ENTOMOLOGY.

Honolulu, July 31, 1911.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen:—I herewith respectfully submit my report of the work of the Division of Entomology for the month of July.

During this month we boarded 34 vessels and we found fruit, vegetables and plants on 15 of them.

The usual careful inspection was made of all the shipments with the following results:

<i>Disposal with principal causes.</i>	<i>Lots</i>	<i>Parcels</i>
Passed as free from pests.....	864	14,727
Burned	9	21
Fumigated	5	9
Returned	1	1
Total inspected	879	14,758

RICE SHIPMENTS.

During the month there arrived 29,638 bags of rice, of which 227 bags arriving on the China on July 7 were found to be infested with the larvae of a moth, probably *Pyralis farinalis*, a very common cosmopolitan pest. On July 15 another shipment of rice arrived on the Manchuria and although the shipment was much cleaner than that on the China we found 2367 bags infested with the same pest. We notified the consignees of the condition

and they would not return the rice we ordered it all fumigated. It was placed in the tight rooms on the channel and subjected to the fumes of carbon-bisulphide for five days and when we examined it we found all the larvae black and partly dried. All the consignees cabled to Japan immediately to prevent further shipments from being made unless they were first fumigated, therefore and I am pleased to say that the last shipment was in perfect condition.

PESTS INTERCEPTED.

During this month rice shipments were found infested with several pests, which at this season of the year is to be expected, but as stated elsewhere all infested rice was not passed until thoroughly fumigated, the consignees bearing all expenses.

In a shipment of plants from Japan we found a large nest of ants in all stages which were thoroughly subjected to fumigation.

BENEFICIAL INSECTS.

Eight lots of Japanese beetle fungus were distributed during the month.

I received a cable from Midway Island advising me of the arrival in good condition of the colony of vedalia which was sent last month.

Brother M. Newell, Inspector at Hilo, reports the arrival of six steamers and two sailing vessels of which four steamers brought vegetable matter consisting of 125 lots and 1631 parcels. Seven crates of plums were destroyed on account of a fungus.

INTER-ISLAND INSPECTION.

On July 1 we started two inspectors on inter-island inspection, Mr. A. E. Carter as inspector and Mr. Ed. Drew as assistant. It is very gratifying to be able to report that we have found the people very much interested in our work and most of them avoid taking any fruit along and only occasionally do we find someone who did not know about the new regulation. We have had notices printed in English, Portuguese, Hawaiian and Japanese, and all passengers when purchasing a ticket receive a notice printed in English and Japanese, stating that no fruits, melons, vegetables or roots grown on Oahu can be taken to any of the other islands. Also that no soil or plants with soil can be taken and all such must first be submitted to the Superintendent of Entomology who will attach a tag if they are found free from pests.

Five thousand copies of Rule IX, regarding the inter-island inspection, have been printed and quantities distributed.

The advisory committee appointed by the Board to take up the fight of the Mediterranean fruit fly, of which I am chairman, have been able to coöperate with the existing machinery of the Board of Health and of the garbage department of the city government and everything is now being done to reduce the pest by clean culture methods, and some very encouraging reports have already been received, showing a marked reduction of the pests in certain localities.

Respectfully submitted,

EDW. M. EHRHORN,
Superintendent of Entomology.

THE LEMON TARIFF AND THE SAN DIEGO EXPOSITION.

(The Forester Correspondence.)

Washington, Aug. 12.—The farmer and fruitgrower is likely to feel that he is too often discriminated against by the railroads, by the tariff, by the commission men, by almost everyone with whom he comes into contact. He has so long been pictured as a "rube" who readily buys green goods and gold bricks that he is tempted to think, at times, that even Uncle Sam looks on him in that light. For years the farmers have been asking for the same measure of protection in the tariff that has been accorded freely to the laboring man and the manufacturer. Has he got it? Not always. Occasionally the man who tills the soil has got something but it has been hard won, and no sooner did he get it than powerful forces were arrayed to snatch it away from him.

Take a concrete case. In Florida and California the climate was found to be suitable for growing oranges and lemons. Enterprising pioneers in both states took up the new lines with enthusiasm. They met with many discouragements and setbacks. There were insect pests, frosts, droughts, scarcity and high cost of labor, unknown problems to solve, years to wait for returns, and competition from foreign lands when other problems had all been reduced and success achieved. Orange growing reached a stage where the home growers controlled the market and competition was little feared. Lemon growing continued to be a hard fight although the problem of producing a better lemon than the imported had been solved and 50 per cent. of the home market was supplied by home-grown lemons. The extension of the market was checked because the importers, with cheap home labor and cheap ocean freights, could, and did, keep the American fruit from reaching the seaboard whenever they wished to do so.

Congress wanted to give the American growers an even break, and added one-half cent per pound to the tariff on lemons, or about one and one-half cents a dozen, one-eighth of a cent on each lemon. During the hottest portion of the summer lemons were in Washington at 10 and 20 cents a dozen. No one found any complaint with this except the Italian importers in New York City. They started in at once to raise a slush fund to fight the tariff. The growers in Sicily and Italy agreed to pay from 5 to 10 cents on each box of lemons imported into the United States to help fight the tariff. They began a campaign to arouse the American public to a belief that it was being wronged, and to influence Congress to remove the tariff on lemons. Congressmen expected to be by the agents of the importers, the pushcart men and the retail fruit dealers. Untruthful petitions were circulated, so untruthful that their mendacity was evident at a glance. One form of petition refers to the "tariff on lemons,"

alleged to be "for the purpose of doubling the wealth of ten or a dozen millionaires of California, and also for the purpose of paying the wages of tens of thousands of Japanese soldiers who exclusively monopolize the labor of the California lemon orchards, thus depriving American laborers of opportunity of labor and wages."

This is very absurd, as well as false. To patronize the foreign lemon growers and steamship companies would be better, the importers think, than to patronize American railroads, American orchardists and American labor. Japanese are employed to a very small extent in the region where lemons grow. If there were enough white labor they would not be employed at all. Moreover, oranges and lemons are now grown in Arizona, Texas, Florida, Alabama, Mississippi and Georgia.

Such petitions as those just referred to have been circulated at Atlantic coast summer resorts by "barkers," such as those who attract attention to the shows at seaside amusement parks, and many small boys signed them. Posters have also been displayed by these Sicilian agents charging the "high cost of living" on the lemon tariff, which would not cost the average person one cent in a year, if anything at all, for lemons have actually been cheaper this year than they were before the duty was increased, so that the dealers (who are really at the mercy of the importers), are promising a great deal if they promise to reduce the cost of lemons in case the present tariff is repealed.

The fact is that the duty was not a serious burden to the importers until very recently because the execution of the customs regulations permitted them to claim, and to obtain, a rebate for alleged rotten fruit, amounting sometimes to fifty per cent. of the cargo, which they were clever enough to sell afterward as first-class, sound fruit. This has been stopped. A close observer in Washington said recently:

"What the government has lost in customs frauds will never be known, but as Collector Wm. Loeb, Jr., has shown at New York alone, the sum must reach many millions of dollars. Importers have shown the greatest cunning as well as unscrupulousness. They have had to refund millions of dollars to the Treasury Department. Some of the Italian importers were sent to jail. The Italian lemon importers are the latest to have been circumvented, but the government had to revise the regulations for the importation of lemons in order to head them off, and it took eight months to find out how to meet the case. Aided by an almost unlimited 'slush fund' put up by the Sicilian lemon growers, and by very shrewd and resourceful lawyers who are spending money lavishly to buy magazine and newspaper space, the Italian importers are now seeking to have the tariff revised in their interest. This is not the first time foreign interests have tried to shape legislation in Congress, but it is one of the bol

The way the Treasury Department stopped the importers tr

obtaining too big an allowance for decayed fruit was to make the estimates for rot on the samples displayed for sale. Almost any disinterested person would say that this was fair, but the importers protested wildly and vehemently. The Treasury Department, however, thought mere noise no argument, and the amount of money collected has increased.

The fact is, the tiller of the soil will have to be considered when it comes to fixing up a list of producers who must have a fair share of protection. Legislation by Congress should be for the benefit of the people Congress represents, and not for the benefit of Sicily, Japan, Mexico, Spain, or any other country.

One reason why many men, after retiring from business undertake orange and lemon culture is the romantic interest attaching to it in a land where winter is unknown. But they need some profit to keep them interested in their work. Unless the efforts of the importers to cripple the industry in California shall succeed, the orange and lemon groves of that State will prove to be among the most interesting things the visitors to the 1915 Panama Exposition in San Diego and San Francisco will see.

SCHOOL GARDENING IN HAWAII AS RELATED TO AGRICULTURAL EDUCATION.

VAUGHAN MACCAUGHEY, the College of Hawaii.

(Read at the Convention of the National Education Association, San Francisco, 1911.)

The general nature of school-garden work in Hawaii has been stated in a paper published in the *Southern Workman*, July, 1910, and later reprinted as a bulletin of the College of Hawaii. The present discussion will be confined to the particular relationships, in Hawaii, between school-gardening and agricultural education in general.

In order to understand the educational situation in Hawaii, with reference to school-gardens, one must know the general conditions of life. The population of Hawaii consists, approximately, of 35,000 Hawaiians and part-Hawaiians; 27,000 Latins, chiefly Portuguese; 95,000 Orientals, chiefly Japanese; and 2,000 Teutons, chiefly Americans and English. The natives have been farmers and fisher-folk since the dawn of their history. Indeed, the nature of their island world was such that there were no other means of livelihood. Their food supply came almost wholly from the fertile lowlands that engirdle the islands, and from the bounteous ocean. "The limited area of the islands precluded nomadism; the entire lack of large game cut off hunting; and the absence of grazing domestic animals prevented pasturing life." The Hawaiian was compelled, perforce, to accept a purely agricultural existence.

The Americans and English have been the exploiters, devel-

opers, promoters, of the agricultural resources of the islands. To their ability is due the phenomenal growth of the sugar industry, which has systematically fostered the importation of large masses of cheap labor, mainly the Orientals and Latins above mentioned. The sugar industry was also the main factor in the annexation of Hawaii by the United States. The immigrants brought in to supply the plantations were naturally drawn from agricultural classes, accustomed to country life and to farm labor. They live very simply, receive small wages and raise large families, as do similar classes the world over.

The indigenous and immigrant population of Hawaii is therefore, by both heredity and necessity, almost entirely agricultural. Living on a relatively low plane of life, they have desired but scant education for their children. With the exception of those in Honolulu and Hilo (the only cities in the Territory), the schools are country schools, usually near sugar plantations. With the exception of a few large ones in the above-named cities, the schools are almost entirely primary schools, covering only the work of the first four grades. Of the 20,245 pupils in the public schools in 1910, 17,369 were in grades one to four, inclusive; 2,486 in grades five to eight, inclusive; and but 254 in high schools. There is but one first-grade public high school in the Territory.

In 1910 the nationalities of the children in the public schools was as follows: Hawaiian and part-Hawaiian, 30%; Orientals, 40%; Latins, 20%; Teutons and others, 10%. Hawaii's great school problem is therefore to furnish primary education to non-English-speaking peoples of the lower classes. It is in the solution of this problem that the schoolgarden, as a part of agricultural education, can play so important a role.

Agricultural education, in the strict sense of the word, has never received adequate attention in Hawaii's schools, no more than it has in other school systems. The reasons are the same here as elsewhere—inappreciation of manual activities, lack of trained teachers, etc. In addition, the necessity for teaching English to non-English-speaking peoples has tended to make the curriculum lean toward drill work in language.

The majority of the white men who first came to the islands were unfamiliar with agricultural processes, especially those connected with tropical agriculture, and for a long time had little interest in it. The sugar industry, and other farming enterprises, are managed by large corporations on the plantation system, employing principally alien labor. In Hawaii there has never developed a permanent community of white farmers working their own land; indeed, social and industrial conditions have been prohibitive to such development. There are no "farmers' children" in the sense in which that phrase is used on the mainland; there is no "country life" equivalent to that of "the states."

The white people have, in general, favored the education of the lower classes along industrial lines, for several reasons: to fur-

nish indigenous skilled labor for the various trades, thus making them independent of the more expensive coast supply; and because of a prevalent attitude that the American public school education was not suited for, in fact might be considered "too good" for, the children of the lower classes.

Principal Edgar Wood, of the Territorial Normal and Training School, is strongly urging the adoption of the following system of industrial education, with which school-garden enterprises will be closely articulated:

"There is at the present time considerable agitation throughout the United States, in fact in most countries where the development depends upon the agricultural resources and the belated industries, toward the establishment of continuation schools of the industrial type. This agitation seems to be in a general way taking hold of Hawaii. Many of our leading citizens have expressed their belief that such schools would be applicable to our conditions, and would prove of great benefit in training boys and girls, who have passed the compulsory school age, into productive workers of the community. It is believed that these schools would tend to greatly reduce the number of boys and girls now in our reformatory schools. * * *

"A plan is proposed which in brief asks for the establishment, on each of the four islands, Kauai, Oahu, Maui and Hawaii, of schools contiguous to important centers of industry. These schools to give instruction in agriculture, home economics, trade and industries. This instruction to be given in field, garden, kitchen and shops, and to be of such a practical nature as to enable the pupils at the end of the course to take up work in connection with the respective industries at remunerative wages.

"The type school for such a system is as follows: A school shall be established in a given locality when twenty-five students can be assured. The attendance of all boys and girls between the ages of 14 and 18, both inclusive, who are not otherwise wisely and profitably employed, shall be required. It shall be incumbent upon all parents, guardians and others having the responsibility and care of children of all ages, to send them to the school established in the locality if they are within four miles, or farther if suitable transportation is provided. Others may attend at the discretion of the Department of Public Instruction, e. g., men who may wish to improve as workers.

"The equipment of the school shall consist of: A farm of not less than 25 acres, to be increased in proportion to the number of boys attending by two and one-half acres per boy, and to be equipped with essential hand-tools. Shops equipped to meet the needs of the industries of the environment. Residence buildings provided with sanitary and culinary equipment for properly housing and feeding the pupils.

"Students shall be remunerated for their work in accordance with current value, to be determined by some schedule such

time, profit-sharing, or piecework. Students shall work the first two years on the farm or in the shops of the school, and the last two years one-half of each day in the fields or shops of the industry of the locality. The rest of the day will be devoted to the study of related academic subjects—mathematics, geography or industry, reading and writing.

“The Department of Public Instruction will engage and pay all instructors. The industry will supply lands, buildings and equipment, and pay the students working for them in fields, shops, etc. The school shall cultivate the land set apart by the industry and pay the pupils out of the proceeds of the crop.” (From Report of Superintendent of Public Instruction, 1910.)

The majority of the country schools are on areas of land sufficiently large to permit the development of school-gardens. Such gardens are encouraged by the Department of Public Instruction, and in many cases the teachers themselves are, by training, proficient gardeners. It is noteworthy that of the total 501 public school teachers, 225 are Hawaiians or part-Hawaiians; 41 Portuguese, and 18 Orientals.

In general the school gardens of Hawaii differ markedly from those of the mainland, in that they are not divided into individual plots, but are common property, the individual pupils not having specific areas. This is doubtless due to several factors—the overcrowded condition of many rural schools, making individual assignments impracticable, and to the fact that many of our most important and interesting crops are long-season plants. Indeed many of the mainland annuals are perennial, or nearly so, here, for example, cabbage, parsley, eggplant, peppers, tomatoes, etc. Moreover, the school-gardens of Hawaii are rural rather than urban, and there is lacking that brisk demand for garden plots that characterizes our city populace.

The School Fund Commission, in its recent report, makes the following statement regarding agricultural work in the public schools: “Nine thousand three hundred and nine pupils engaged in gardening. Practically all children doing some yard work. More than 125 schools actively engaged in agricultural work, two schools planting sugar-cane on commercial basis. Work consists of clearing and preparing land, keeping grounds in order, vegetable-gardening, flower-gardening, tree planting. The plants most commonly raised are taro, potatoes, tomatoes, pineapple, cabbage, carrots, parsley, egg-plant, lettuce, corn, onions, string beans, beets, cucumbers, melons, turnips, sisal, various flowers. The trees and ornamentals most commonly planted are silver oak, monkey-pod, bougainvillea, algaroba, pride of India, pepper-tree, orange, avocado, banana, poinciana, palms of various species, ironwood, eucalyptus, camphor, lemon, lime, mango, papaia.”

Prizes have been effectively used as a stimulus to agricultural work in the public schools. Mr. C. E. Copeland, of Wailuku, Maui, says “that in 1907 the Evening Bulletin offered five prizes

of twenty-five dollars each. Some twenty-five schools entered the contest, the pupils reporting weekly, under the following heads: the work done, condition of soil, name of crop grown, methods of cultivation, watering, weeding, etc.; amount of growth made, extermination of pests, and general remarks. At the close of the season a tabulated statement of work done and results obtained was rendered. The vegetables grown were selected from the following list: lettuce, onions, cabbage, beets, tomatoes, beans, egg-plant, carrots, cucumbers, turnips, melons, sweet potatoes, parsley, Japanese cabbage and peppers. Official committees awarded the prizes at the various exhibits. The competition was very satisfactory to all concerned, and demonstrated that in many, if not all, of our schools, vegetable gardening can be successfully done.

"All of our pupils have abundant opportunity for outdoor work and play all the year round. Practically all have space and means at home to grow flowers and plants. Practically all take advantage of these opportunities. The fondness of the Hawaiians for trees and flowers is well known; the Portuguese are mostly agriculturalists and gardeners, and many of the Japanese are expert horticulturalists. Thus it happens that the most of our pupils are already familiar with the growth of vegetables, flowers and trees. The teacher's chief work in agriculture is to guide the pupil in the application of knowledge already possessed; to encourage their natural fondness for plant life; to develop in them a desire to own and cultivate the land; to form habits of thrift and industry, and to make the school premises models of neatness, order and sympathy upon which they may pattern their own dooryards."

In addition to this gardening work of the elementary grades, agricultural work of a more advanced nature is carried on regularly in the industrial schools. The Lahainaluna School reports systematic classroom studies of soils and fertilizers; the various economic plants, their culture and uses; care of farm animals, and studies in economic entomology. The students supply the commissariat with a variety of vegetables and fruits. In addition to the smaller gardens there are large plantings of sorghum, sisal, pineapples and upland taro.

The Boys' Reform School reports the following plantings since May, 1910: Taro, 13 acres; bananas, 2; sweet potatoes, 8; squash, 3.5; other vegetables, 2; alfalfa, 2; other grasses, 3; sorghum and corn, 1; cotton, 1; sugar cane, 30. The methods employed are those of a modern diversified farm, the boys doing the work under competent instruction.

The farm department of the Hilo Boarding School is well organized, with an agricultural-college graduate at its head. Thirty acres of land are under cultivation. The farm contributes nearly half of the upkeep of the dining hall. The main crops are taro, bananas, pineapples, broom corn, cowpeas, vegetables, fruits and fodder. The Federal Experiment Station has just established a sub-station on land adjoining the school farm, and the work on this station is to be done by the school.

The Territorial Normal and Training School, at Honolulu, gives a large place to nature-study, elementary agriculture and school gardening. A portion of the school's land is laid off into gardens, and here the cadets are given practical instruction in the raising of crops. They are also instructed in the supervision of garden-work, pupils from the grades carrying on work under their direction. The crops are used by the domestic science department in the preparation of the noon lunches, which are sold at cost price to the pupils and teachers. In the kitchen the cadet is thoroughly trained in the best methods of cooking and serving the products of her labor in the garden. The kitchen is on a self-supporting basis. Some typical lunches, illustrating the use of garden-products, are as follows: 1, tomato soup, mince pie; 2, meat stew, papaia sherbet, buttercup cake; 3, vegetable salad, creamy rice pudding; 4, corn chowder, strawberry ice cream, cake.

In the classroom, the cadets are given subject-matter and methods of teaching the important economic plants and animals, and similar subjects comprising elementary agriculture. The plants include such types as banana, cotton, coffee, guava, papaia, rice, sugar-cane, sisal, taro. The industrial phases of crop-production are emphasized, the studies including all of the stages from the selection and preparation of the land to the final transportation and marketing of the crop.

Teachers who are interested in school-garden work can avail themselves of assistance from a number of sources. The College of Hawaii offers two correspondence courses in this field, one in plant life, another in practical horticulture. The Normal School in 1910 issued a "Synopsis of Nature-study Work for the Elementary Schools of Hawaii," of 150 pages. The publications of the Federal Experiment Station contain much practical information. The Department of Public Instruction issues a monthly, "Hawaii's Young People," a portion of which covers nature-study subjects. The Territorial Bureau of Agriculture and Forestry furnishes seedling trees, vegetable seeds and similar material gratis to teachers.

The school-gardens of Hawaii are a part of the forward movement in education. They are supplanting the medieval bookishness of former days. They stand for the beauty and dignity of real things. They are simple. They are within the child's realm. Their pleasant influences reach into his heart through the happy labor of his hands. They typify fundamental institutions.

The school garden has a broad outlook toward life. It is optimistic. It is bound to survive.

THE MILK SUPPLY OF HONOLULU.

Report by the Territorial Veterinarian on the Milk Supply of the City and County of Honolulu with Special Reference to Bovine Tuberculosis among the Dairy Herds of the Territory, addressed to the Territorial Board of Health and the Board of Supervisors of the City and County of Honolulu, by direction of the Territorial Board of Agriculture and Forestry.

Honolulu, July 17, 1911.

Gentlemen:—By direction of the president of the Board of Agriculture and Forestry and especially by the Committee on Animal Industry of this Board, I have the honor to submit herewith a report on the present state of health of the dairy animals of the City and County of Honolulu as bearing upon the local milk supply.

This report is based upon the work carried on by the Division of Animal Industry for the past year or more in an attempt to regulate the local milk supply in accordance with an ordinance passed by the Board of Supervisors of the City and County of Honolulu, under date of March 21, 1910, which ordinance, among other specifications, requires that all dairy animals from which milk is obtained for human consumption must have passed the tuberculin test.

When this ordinance was under consideration it was a well known fact that tuberculosis was prevalent among the cattle in a number of local dairies, for which reason a public meeting was called in order to allow the dairymen to express their opinions as to the advisability of including the tuberculin test among the requirements for a wholesome milk supply, as enumerated in the various, more or less stringent, specifications of the ordinance. The measure was favored by a majority of the dairymen present, and especially by those who had already inaugurated a system of eradication, that is by the up-to-date and progressive milk producers, who realized that, sooner or later, the disease would have to be dealt with as a prohibitive factor, the presence of which was incompatible with a wholesome milk supply.

In order, however, not to make the ordinance oppressive or difficult to comply with for financial reasons, it was decided that the expense of the tuberculin test should be borne by the public, and the understanding was reached whereby the Board of Agriculture and Forestry assumed the actual work of testing the dairy animals belonging to applicants for permits to sell milk.

The first official tuberculin test was begun during the spring of 1910, and the conditions which were immediately disclosed were such a revelation as to cause, to say the least, consternation. The prevalence of the disease among the dairy herds of the Territory was demonstrated where, about a decade ago,

an official test was made, as a result of which a large majority (it was then believed) of the affected animals were destroyed; but that the disease should have spread, either from the surviving affected animals or from imported stock, to the extent which was disclosed by the present test seemed unbelievable, and it was not until a number of owners of reacting animals had been satisfied by post-mortem demonstrations, that the reactors were actually affected with the disease, that it dawned upon the community that it was face to face with at least *one* of the sources of the great mortality from consumption among the population of the Territory. However, it is unnecessary here to recall the appalling percentages of affected animals which confronted a number of dairy owners, and which made it practically impossible to enforce the municipal milk ordinance, without causing a milk famine, while, at the same time, misguided sentiment in regard to the disposal of the carcasses of reacting animals made it next to impossible for the owners of infected herds to rid them of the disease, except at a complete, and often ruinous, sacrifice. Under these circumstances there seemed for a time little prospect of a speedy solution of the milk problem, and the fact that we are now, less than eighteen months from the beginning of this campaign, entering upon an era of *clean milk* for the City and County of Honolulu is due, principally, to two men, to whom I consider it a privilege here to give the credit which so fully belongs to them.

Mr. Isenberg and Mr. Pond, or Mr. Pond and Mr. Isenberg, while employing diametrically opposite methods, have both accomplished what might have seemed the unattainable. Both captains in the dairy industry, each counting his milk producers by the hundred, have cleaned their heavily infected herds from tuberculosis, voluntarily, unsubsidized and at great financial sacrifice, blazing the way for others to follow—a way which no ordinance, statute, rule or regulation could have enforced, and obviating indemnification and litigation *ad infinitum*.

While Mr. Pond has worked for years, keeping at it steadily, familiarizing himself with the various diagnostic agents and methods, eliminating the diseased animals whenever physical symptoms made their appearance, replenishing his herd only with tested animals, and drawing freely on the time and advice of the local officials, he was able when the crucial test came to present for examination a herd which to all intents and purposes was clean, literally as well as technically.

Mr. Isenberg, on the other hand, had always been a breeder, raising his own cows, using imported tuberculin tested sires and, from the appearance of his herd, had no reason to suspect any extensive infection among them. This surmise was also borne out by the tuberculin test. It was, therefore, a great surprise when the official test disclosed the presence of a large number of infected animals. Mr. Isenberg, however, decided at once that no milk from affected animals should be allowed to reach the human consumer and began immediately to destroy all reactors.

Not satisfied with this, and realizing the necessity for some means whereby the milk consumers of Honolulu might be protected from infection, at least during the period which necessarily must elapse before all tuberculous cows could be done away with, he, as president of the Honolulu Dairymen's Association, began at once to make inquiries for the most effective and reliable milk purifying machinery, for which purpose he visited the Department of Agriculture in Washington, D. C. He finally decided on the installation of one of the Goucher Electric Milk Purifying Plants, which may now be seen at work in the association's establishment on Sheridan street. What I most want to emphasize, however, is the fact, that even though this purifying plant, which has been placed under the immediate supervision of the Division of Animal Industry, is known to destroy all disease germs which might be present in the milk, Mr. Isenberg has not alone persisted in disposing of all of his reacting animals, so that he now has an absolutely clean herd, but has, in conjunction with Mr. Pond and the other officers of the Dairymen's Association, issued orders that, from and after July 15th, the Association will receive no milk from dairies having reacting cows on the premises.

This step on the part of the Dairymen's Association, which was only taken after due deliberation, and when it was seen that some dairymen would never get rid of their affected animals so long as they could send their milk through the purifier, practically makes it obligatory for the owners of reacting cattle to either dispose of these animals or else violate the laws of the Territory.

As already stated, however, the examples set by Mr. Isenberg and Mr. Pond have had a salutary effect upon a number of smaller dairies, but it is, nevertheless, a pleasure to state that a large number of independent dairies have disposed of their reacting animals, improved their premises and their methods to conform with the city milk ordinance, and that practically every one of the dairies which was found to be free from the infection when the campaign was first inaugurated have made similar efforts; and that, taken altogether, the milk supply of Honolulu is so greatly improved over what it was 14-16 months ago that it exceeds by far what could reasonably have been expected. As all of this has been accomplished without any harsh methods or onerous regulations it is suggested that the few dairies which still remain delinquent, but which show a disposition to come into line, be granted until the end of the present month to do so, with the understanding, however, that a failure to comply with the very reasonable demands of the municipal as well as the Territorial requirements will be followed by a peremptory revocation of their permit to sell milk.

The appended list of 78 dairies, comprises the milk producing establishments, on the premises of which no tuberculous, or reacting cattle are found, and where only officially tested and tagged

cattle are being milked. A number of these do not *sell* milk, and as many, both producers and consumers, are under the impression that, so long as no milk is *sold*, it is not necessary to have a permit or to conform with the requirements of the municipal milk ordinance, it may be well here to emphasize that section 1 of the said ordinance makes it obligatory for the milk producer to obtain a milk permit, whether his product is for *sale, use or consumption*. As nobody keeps a cow except for the purpose of either selling, using or consuming, or delivering for sale, use or consumption the milk from such cow I cannot see how even the keeper or owner of a single private or "family" cow can avoid taking out a milk permit. When this fact is fully known the number of applicants will undoubtedly be somewhat increased, even though, as stated, a number of the applicants on the appended list do not sell milk.

The requirements of section 2, to the effect that all applicants must furnish a certificate from a veterinary surgeon showing that all cows in his or her possession are free from tuberculosis would seem to be met by the transmission of the appended list in so far as those applicants are concerned whose names appear on the list. All other milk producers, or cattle owners, have either not complied with the requirements or else have had the test performed by veterinarians not connected with this office, and it must be left to the respective officials, whose ordinances or regulations require such certificates of health, to decide whether the same are acceptable or not. It is, however, suggested that such certificates specify whether the animals referred to have ever been tested before, and that, in case they have reacted to such previous test, the question of the health of such animals be referred to the Territorial Veterinarian for decision. The policy of this office is, however, the same as that adopted wherever official tuberculosis control work is undertaken and may be expressed in the one sentence "once a reactor, always a reactor."

As already stated there still remain a few dairies to be brought into line, and the somewhat optimistic view in regard to the present status of the milk supply of Honolulu, as conveyed by this report, is not to be construed into a belief that ideal conditions have been reached or even are near at hand. Far from it. While hygienic and sanitary conditions of dairy premises in general have improved immensely, there is still plenty of room for further improvement, especially in the substituting of old stables and milk rooms with new and more modern ones. The immediate cooling of the milk, to a degree far below that required by the present ordinance, is another very important step toward which we must constantly strive, and which must be everlastingly kept before the producer who delivers his milk direct to the consumer. If another milk depot similar to the one on Sheridan street, and located in Palama or Kalihi, could be established, the regulations might be altered to compel the purifying, cooling and aeration of all the milk consumed in the city proper, but until such a time

the educational work must be continued and the many smaller producers must be kept up to the mark through frequent visits and constant urging with regard to improvements of methods, premises and utensils. That the health and condition of the dairy animals must be kept under continued observation goes without saying, as otherwise it would be but a very short time before many of the now clean herds would have the infection back and further losses impending.

The buying, selling, exchanging, leasing and transferring from one dairy to another of tested or untested, fresh or dry, old or new milch cows, heifers or bulls, must be kept under surveillance. A card index is now kept in this office, by means of which each tested and ear-tagged animal can be located at a moment's notice, and the transfer of tested animals from stable to stable is recorded as soon as known. Another index shows the serial number and the date of testing of each animal in the possession of each owner. It is further intended to have this index embrace sanitary and hygienic conditions of premises and in fact everything pertaining to each individual dairy, not for the purpose of usurping the work or the duties of the milk inspector, but in order to facilitate and systematize the same and avoid unnecessary repetition of work, which the coöperation of the three boards makes it desirable to have collected and recorded in one place.

In this connection I wish to state that the present method of having the milk inspector accompany the inspecting and testing officer of the Division of Animal Industry has proven of unlooked-for value and has greatly facilitated the work of both, not alone so far as transportation is concerned, but principally in combining the authority of the two officers, thereby avoiding repetition of instructions, which if delivered at different times by officers working independently of each other might easily lead to misunderstanding or confusion especially when dealing with Oriental and other owners or laborers of foreign birth. If therefore the present arrangement does not interfere with any other instructions or duties of the milk inspector and if the work as here reported on meets with the approval of the respective boards I am authorized to state that the tuberculosis control work will be continued along the same lines as hitherto. If any further difficulty should be met with in having the remaining tuberculous cattle (reactors) removed from premises where milk is produced or where the infection may be transmitted to other animals, it might be well to publish a "by authority" notice in the daily papers giving a concise definition of what constitutes impure, adulterated, unhealthful or unwholesome milk, with special reference to milk from diseased animals, as defined in the statutes of the Territory and in the municipal milk ordinance now in effect. It is, however, believed that this step will not be necessary and that consequently it would be better not to again alarm the public on this subject.

List of dairies in the City and County of Honolulu entitled to

permits to sell milk, in so far as they have complied with Section 2 of Ordinance No. 17, requiring that all cows in the possession of the applicants are free from tuberculosis:

Name.	Address.	No. of Cows.	Per- mit No.
P. M. Pond, The Pond Dairy, Monsarrat Rd., Honolulu		107	1
P. M. Pond, Mokuleia, Oahu		268	2
C. J. Day, 1044 Kalihi Road, Honolulu		4	3
Kahuku Plantation Co., Kahuku		25	4
I. Nagaki, Manoa Valley		10	5
Mrs. Mary Riedell, 1156 Gulick Avenue		10	6
F. H. Kilbey, Kaimuki		11	7
Oliver Tavash, Kunawai		5	9
V. Souza, Kahauiki		34	12
John Regent, Kalihi		13	13
Wm. P. Alexander, Jones Street, Manoa		4	15
Geo. Wohd, Holt Lane, Honolulu		12	16
Dairymen's Association, Sheridan Street	17
D. P. R. Isenberg, Waialae		150	18
S. M. Damon, Moanalua		314	19
Frank Andrade, Manoa		86	20
Chas. Bellina, Nuuanu		56	22
George Holt, Kalihi		55	23
Kaitulani Dairy, Kalihi Valley		9	24
Antonio Pires		4	27
H. E. Cooper, Manoa		13	28
Kamehameha Schools		40	29
Sylvano de Nobriga, Nuuanu		11	30
Sengiro Tsumoto, Pauoa		10	32
Omai Talsuichi, Pauoa		7	33
T. F. Farm, Wilder Avenue		33	36
Pamijuro Miyakawa, Ocean View		12	37
Mrs. Fred Whitnev, 1366 King Street		5	38
Frank Medeiros, Metcalf		11	39
J. L. Robinson, Nuuanu		3	40
M. Kawamura, School Street		10	42
L. P. Fernandez, Kalihi		6	43
J. H. Cummings, College Street		5	44
J. Morioka, Waimalu		11	45
J. M. Whitney, Punahou Street		10	46
Alex. Young, Kalihi		34	49
Kapahulu Dairy, Kapahulu (Marshall & Aze- vedo)		19	51
T. Nakamura, Puuloa		7	53
Mrs. C. M. White, 1417 Makiki Street		8	54
S. Tado, Waikele		10	56
Richard Kapena, Puunui		2	58

Manuel August, Puunui.....	1	59
E. K. Ellsworth, Pupukea.....	10	60
S. Buyama, Kalauao.....	4	61
Y. Ogawa, Waialua.....	...	62
T. Fuginaka, Halawa.....	4	63
Waianae Ranch Co., Waianae.....	273	64
R. W. Andrews, Wyllie Street.....	1	65
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CTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF COMMITTEE ON ANIMAL INDUSTRY.

The Committee on Animal Industry begs to report that having
employed a Territorial Veterinarian on the milk supply
with special reference to

bovine tuberculosis, it is recommended that the same be accepted and that the Territorial Veterinarian be instructed to transmit the same to the Territorial Board of Health and the Board of Supervisors of the City and County of Honolulu for such action as these boards may see fit to take, especially in regard to the continued coöperation with the Board of Agriculture and Forestry for the purpose of eradicating bovine tuberculosis as an essential factor in a wholesome milk supply.

DUCKS.

Very little appears in this journal about turkeys and ducks, a correspondent writes, and we find on referring to back numbers over a period, that this is so. Nevertheless there are a hundred people interested in fowls for one who keeps turkeys and ducks, and for every ten turkeys and ducks one hundred fowls are kept.

What we notice about Muscovy ducks is that their looks belie them—they look big but their weight is small; they are largely feathers, and we think this is greatly due to the bad start they usually get when young owing to the way they are fed. Mostly, ducks take pot luck, share the same food as the fowls, and are obliged to pick up grain like corn, which is an entirely unsuitable food for ducks. The natural diet of ducks, which are aquatic birds frequenting streams, lakes and marshes, finding the bulk of their food in the water, is of a soft nature, and unlike the fowl they have no capacious crop to store food and no large strong gizzard to grind hard food, together with the sharp grit that fowls pick up. Fowls should not be fed sloppy food, but this is exactly how ducks should be fed. You can feed soft food in the morning to fowls but they would not thrive on sloppy food. The distinction between the terms soft and sloppy is as follows—soft food for fowls, is meal mixed with scraps into a thin crumbly paste, but if more water is added until it gets a thin paste it becomes sloppy and suitable for ducks. But ducks can take soft food made for hens, as they will after a few mouthfuls go and drink enough water to clear their bills and wash the stuff down. But hard corn or oats is not a good food for ducks, for them such food is slow and hard to digest. Ducks too, need more animal food than fowls to get quick and good growth. When we see our ducks do not get enough insect food we feed blood meal in their food and a little of that—a tablespoonful to a brood of young ducks—has good effect. Table scraps are excellent.—*Journal of the Jamaica Agricultural Society.*

for administration to persons rescued from starvation, or perishing from intense cold, when spirits given under these conditions often prove fatal. It dispels languor, stupor and lethargy, and, given sufficiently strong, is the finest specific antidote in cases of poisoning.

Fresh roasted coffee has proved to be an effective dispeller of foul gases, as well as a valuable disinfectant, in the sick room, especially when the room or place to be disinfected is near where the coffee is being roasted.

A DESTROYER OF TYPHOID BACILLI.

Some years ago, when Mr. William Field, the largest coffee roaster in Great Britain, whose name I am sure is familiar to most of you in the trade, had a factory down in the East End of London, there was a virulent outbreak of smallpox in the district, but there was not a single case in any of the houses immediately surrounding the factory, although there were numerous cases at each end of the same street, and in all the other streets in the neighborhood. Some six or seven years ago a cargo boat went down in the mouth of the Thames, just by the sewage beds. The cargo consisted of 100,000 bags of San Paulo coffee. After very considerable difficulty the greater bulk of this cargo was salvaged and kiln dried. The Port of London Authorities hearing that it was to be put up for public sale in Mincing Lane applied to a magistrate to stop delivery, as they were of opinion that the coffee must be full of typhoid bacilli, and therefore quite unfit for human consumption. After an enquiry lasting two or three days, the authorities lost the day, as it was conclusively proved that even had the coffee become permeated with typhoid bacilli, the process of roasting would totally destroy the germs; a heat of over 200 centigrade being necessary to roast coffee, and no typhoid germs being able to exist in a temperature of over 150 degrees centigrade.

Further than this, the analyst employed in the case, who, by the bye, had only been consulted on the Saturday, the hearing commencing on Monday, had taken two test tubes of semi-digested food, and to one he added just the same proportion of coffee as would be in the stomach, if one took a cup of coffee after a meal. He then proceeded to fertilize typhoid bacilli with very marked success in the one tube without the coffee, but he was quite unable to do so in the tube with the coffee in it.

You know that during the time that I lived out in Singapore, which you know is practically on the Equator, it was a very common thing that if one took a cup of coffee immediately on rising it would act as a preventive for malaria or dengue fever, and there were a number of men of my acquaintance, who, during a long period of years spent in the Tropics, attributed their excellent health to the fact that they had always been temperate and had a cup of coffee immediately on rising.

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SEPTEMBER, 1911

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poincianna, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugh, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications **SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.**

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. VIII.

SEPTEMBER, 1911.

No. 9.

There is an unprecedented absence of official reports in this number owing to the absence of executive officers from both the city and the Territory, preventing the holding of meetings of the board and the rendering of reports. The omission is made up for by the printing of valuable summaries and selections from the Forester's mail.

Before the August number of this magazine had gone through the press, the appointment of Mr. S. T. Starrett of California to fill the new office of marketing superintendent for the Territory had been announced in the newspapers. The event is one of great satisfaction. Mr. Starrett made a report of a preliminary trip over a considerable portion of the Territory, which the editor hopes to obtain for publication in full in the October number.

Part of the title page of the Journal of the Jamaica Agricultural Society is this elevated sentiment: "Agriculture is a profession and occupation in which a man may spend a lifetime, and at the end of it be able to say, in all sincerity, that he has still got far more to learn than he knows. It is only the ignorant who have nothing more to learn."

•

Commissioner Judd saw fourteen hundred acres in beautiful corn at Waimea. At Kapoho he found a homesteader who had made \$2000 the past year in raising sugar cane for a plantation mill. Surely here are luminous proofs that sugar is not the whole thing in Hawaiian agriculture, and that the homesteader properly situated can live handsomely off sugar. Put the two things together and several problems of Hawaii are solved.

PUBLICATIONS.

Report of the International Commission on the Control of Bovine Tuberculosis, 1910. A copy of this has been received from the Department of Agriculture of Canada among other publications from the same source. It is the first report of the commission named, which was appointed by the American Veterinary Medical Association at its annual meeting in Chicago in 1909, and was presented to that body at its annual meeting in San Francisco last September. The commission was a highly representative body, including university specialists, packing industry experts, livestock association men, and board of health and experiment station professionals, nine members being from the United States and five from Canada. The president was J. G. Rutherford, C.M.G., V.S., H.A.R.C.V.S., Veterinary Director General and Live Stock Commissioner of the Dominion of Canada; and the secretary, M. H. Reynolds, D.V.M., Professor of Veterinary Science, College of Agriculture and Experiment Station, University of Minnesota. There is some food for local pride in the discovery from the report that some of the findings and recommendations of the commission have been anticipated by the action of the Territorial authorities of Hawaii, following the initiative of the municipal government of Honolulu in legislation for pure milk. Some disconnected extracts from the report follow:

"There should be no sale or exchange of animals affected with tuberculosis except for immediate slaughter or for breeding purposes under official supervision."

It is held (1) "That tuberculin, properly used, is an accurate and reliable diagnostic agent for the detection of active tuberculosis.

"(2) That tuberculin may not produce a reaction under the following conditions: (a) When the disease is in a period of incubation. (b) When the progress of the disease is arrested. (c) When the disease is extensively generalized. The last condition is relatively rare and may usually be detected by physical examination.

"(3) On account of the period of incubation and the fact that arrested cases may sooner or later become active, all exposed animals should be retested at intervals of six months to one year.

"(4) That the tuberculin test should not be applied to any animal having a temperature higher than normal.

"(5) That any animal having given one distinct reaction to tuberculin should thereafter be regarded as tuberculous.

"(6) That the subcutaneous injection of tuberculin is the only method of using tuberculin for the detection of tuberculosis in cattle which can be recommended at the present time.

"(7) That tuberculin has no injurious effect on healthy cattle."

"This commission recognizes that the discovery of tuberculosis in animals slaughtered for food purposes furnishes one of the best possible means of locating the disease on the farm, and therefore recommends the adoption of some system of marking, for purposes of identification, all cattle three years and over, shipped for slaughter. As tuberculosis of hogs is almost invariably due to bovine infection, this recommendation should also be made to apply to hogs of any age shipped for slaughter."

Among other recommendations are the following: "If the herd is found to be extensively infected, as shown by the tuberculin test or clinical examination, even the apparently healthy animals in it should be regarded with suspicion, until they have been separated from the reacting animals for at least three months. If, after the expiration of this time, they do not react to the tuberculin test, they may be considered healthy and dealt with accordingly. It is recommended that a herd extensively infected should not be treated by the method of general separation, but that the construction of a new herd from the offspring only is desirable.

"If the herd is found to contain a relatively small proportion of diseased animals, separation of the diseased animals from the healthy animals, and the construction of a sound herd from the healthy animals and the offspring of both is advocated." (As a working basis it is advised that herds containing fifty per cent or more of diseased animals be treated under the first plan, under fifteen per cent according to the second plan, and herds falling between these figures graded at the option of the owner.) "That it shall be the prerogative of the owner to reject either plan and have his herd dealt with by removal and slaughter of diseased animals, with or without compensation according to the public policy in operation. * * * In the event of any owner refusing or neglecting to adopt either of the above methods, his entire herd to be closely quarantined, and sales therefrom to be entirely prohibited.

"That a policy of compensation be recommended as useful and usually necessary as a temporary measure.

"That, when slaughter is necessary, in order to avoid economic loss, every effort should be made to utilize as far as possible the meat of such animals as may be found fit for food on being slaughtered under competent inspection."

"That, with the object of preventing the spread of infection, persons buying cattle for breeding purposes or milk production should, except when such purchases are made from disease free herds, which have been tested by a properly qualified person, purchase only subject to the tuberculin test. In order to assist in the proper carrying out of this suggestion, the commission recommends that official authorities should adopt such regulations as

will prevent the entry to their respective territories of cattle for breeding purposes or milk production unless accompanied by satisfactory tuberculin test charts.

"That all milk and milk by-products used as food should be properly pasteurized unless derived from cows known to be free from tuberculosis.

"That the commission recommends the passage of legislation which will prevent the sale, distribution or use of tuberculin by any persons other than those acting with the full knowledge, or under the direction, of official authorities."

"In concluding its work the commission desires to especially appeal to the press, metropolitan, agricultural and local, to join in the work of extending as much as possible among the people the conclusions here arrived at. The vital importance of the life of farm animals to the welfare of all classes of society needs no argument in its support. The aim and sole purpose which has actuated this commission has been to arrive at the soundest conclusions possible in the light of the best knowledge obtainable."

"While the members recognize that the subject with which this commission is primarily intended to deal is the control and eradication of tuberculosis among animals as an economic problem, they cannot feel satisfied without declaring their recognition of the fact that tuberculosis is also an important public health problem. Considered as such, the eradication of tuberculosis among animals should have the approval and support of all those persons who are interested in curtailing human suffering and prolonging human life."

"The control, to say nothing of the eradication, of bovine tuberculosis, is impossible of achievement without the hearty cooperation of the men who are actually engaged in the cattle industry. In order to secure this cooperation, it will doubtless be necessary, in most communities, to carry on an active and prolonged educational campaign."

"The best law ever framed can be made an utter failure by stupid or injudicious administration, while, on the other hand, the most drastic legislation can be rendered acceptable if enforced with reasonable tact and diplomacy. Provided, therefore, that these qualities, combined with integrity, thoroughness and determination, are available for administrative purposes, the members of the commission are convinced that the enforcement of a law based on their recommendations will prove to be far the most powerful and effective educational agency which could possibly be employed."

Reports of committees are appended to the main report, upon which the conclusions of the latter are to a considerable extent based. One is from Hon. W. D. Hoard, ex-Governor of Wisconsin and editor of Hoard's Dairyman, and it urges the value of demonstration work. Mr. Hoard says that the great progress has been made in legislation in Wisconsin and in securing a wide-

spread acquiescence in the use of the tuberculin test, would never have come had it not been for a large number of public demonstrations held in various parts of the State.. He proceeds to say:

"We have gone as far as this in legislation: that after December 1, 1910, all animals sold for breeding or milking purposes must first be tuberculin tested. This, I believe, is a step farther in advance than has been taken by any other State. It shows well the tone and temper of our farmers and the work which has been done to acquaint them with a true understanding of the situation. It is needless for me to say that if they are for the law, or any law, it goes; if they are against it, it is at best a dead letter. It is worth a great deal in the promotion of such objects to have a livestock sanitary board in a State, that will take hold and lead in this work. In too many instances these organizations are purely negative in their influence, and so nothing is done. There is a notable lack of funds to bear the expense of demonstration work. The farmers everywhere would willingly be taxed for its support. Municipalities could well afford to have such expense for the sake of the education it would afford to consumers of meat and dairy products."

Beef Raising in Canada. This is bulletin No. 13 of the livestock branch of the Canadian Department of Agriculture, and a big one, too, for it contains 112 pages and is handsomely illustrated. While much of its technical information and advice will not be applicable to cattle raising in these islands with their mild climate, there is a great deal that will prove both interesting and valuable to Hawaiian ranchers, dairymen and farmers. The pamphlet will be placed in the library at the government nursery.

Horse Breeding and Rearing of Colts is bulletin No. 14 from the same source as the last mentioned. It contains but 13 pages of letterpress, yet appears to be as full of practical information as an egg is full of meat. In the introductory remarks, Dr. Ruth-erford (the author and the man named above as chairman of the International Commission on Bovine Tuberculosis) says "the scrub horse is always a drug in the market, and is sure to be less and less in demand as time passes and public taste in this respect becomes more fastidious. On the other hand, the good horse was never in greater request than he is today. All over the civilized world the prices paid for the good horse of any distinct class are on the rise, and the man who has him or can breed him is sure of his market and his money. This being the case—and that it is so is capable of easy demonstration—it behooves us to do our best to find out how to obtain him."

Proceedings of the Agricultural Conference Held in Connection with the United Provinces Exhibition at Allahabad in January, 1911. This is a pamphlet of 134 pages. Its contents give

a rare insight into the strivings after the attainment of modern agriculture among one of the most conservative peoples of the world. The discussions of the conference treated of the staples of wheat, sugar, cotton, etc., also dairy farming and rural and urban cooperative credit societies, of these last mentioned institutions remarkably good results in the promotion of agricultural and mechanical industries being reported. Enclosed with the pamphlet were bulletins respectively on the cultivation of lucerne and on the foot and mouth disease. The former of these may be worth the while of our stock raisers to peruse, in connection with the long quest for the best fodder plants for Hawaii.

Manurial Experiments with Sugar Cane in the Leeward Islands, 1909-10. This is a brochure of fifty-six pages of the pamphlet series of the Department of Agriculture for the West Indies. Probably its findings will be of interest and usefulness to any of our sugar cane planters who may care to look it up in the bureau library.

FOREST NURSERIES FOR SCHOOLS.

(In connection with the school gardens movement promoted in Hawaii by Professor MacCaughey and others, the following extracts from Farmers' Bulletin 423 of the U. S. Department of Agriculture, under the above title, ought to prove of great interest in this Territory. The technical parts of the bulletin only are omitted, as the treatise deals mostly with trees that are not suitable for the Hawaiian soil and climate. If, however, the matter of forest nurseries for schools be taken up here, the Territorial Bureau of Forestry, together with the College of Hawaii and the Hawaii Experiment Station, may be relied on to furnish the technical directions to teachers and pupils which may be required.)

INTRODUCTION.

In recent years there has been evident a decided movement toward the introduction of nature study and elementary agriculture into the regular work of the public schools. One of the most popular and interesting features of this movement has been the school garden. The large number of schools, both rural and city, which have established gardens, and the volume of literature which has been contributed on this subject, attest the importance and success which the school garden has achieved in the educational system.

The school gardens have been devoted exclusively to the growing of common garden vegetable and flowering plants, but here and there the introduction of new species as an additional incentive to interest. One of the chief difficulties encountered has been that most of the fruits and vegetables suitable

for cultivation and demonstration purposes required by the school work mature or reach their most interesting stages at a season when the school is ordinarily closed for vacation. Another thing which has tended to make much school-garden work somewhat unsatisfactory is that after the work is once done no visible, tangible results are evident, and apparently no lasting good is accomplished other than the instruction given and the knowledge of plant life which may have been acquired.

A school nursery for the propagation of forest trees offers an interesting variation from the usual type of gardening and at the same time overcomes the difficulties just mentioned. The crop of the forest nursery is one which does not disappear with the close of the season, but instead the young trees need only to be transferred from the nursery bed to some new location on lawns or school grounds to become permanent evidence of the work done and a lasting tribute to the school. Furthermore, this work of transplanting the trees is best done early in the spring when the school is in session and at its best so far as the interest of the pupils is concerned. In this way the forest nursery is even more adaptable to school use than is the ordinary garden.

A nursery on the lines laid down in this circular will not require any more labor and attention than a garden, if as much, with the possible exception that there is the added necessity of collecting and storing the tree seeds through the winter. However, if this is found impracticable, tree seeds may be purchased, just as vegetable seeds are, from dealers. The actual work of caring for the nursery is practically the same as that required for the care of the garden. The ground for the seed beds is prepared in the same manner, and the seedlings require about the same amount of attention that the vegetables do. On the other hand, the results will be much more enduring and valuable. Besides the opportunities afforded by the nursery for study and instruction, the trees which are successfully grown will, if wisely utilized, be a source of comfort, beauty, and even profit to the school or community for years.

The plan outlined in this bulletin is intended to furnish suggestions and directions by which a school may establish and care for a small nursery. It is realized that schools will seldom have the best kind of soil available, or be supplied with all the tools desirable to do this work with the best results. Consequently, the attempt is here made to give directions which will be applicable to schools with very limited resources.

It is intended, further, to make these plans usable over as wide a range of territory as possible. Certain localities, with unusual conditions of temperature or humidity, will undoubtedly face local problems which are not touched upon in this bulletin. In all such cases the Forest Service of the United States Department of Agriculture invites correspondence with regard to the difficulties

encountered, and will gladly furnish advice and suggestions free of charge.

Extent of the Undertaking.

Work of this nature should never be undertaken on too large a scale. If too many seedlings are planted, the care of the nursery may prove so much of a burden that the students will find no pleasure in it, and when the trees are grown it will be hard to dispose of them without loss. Should the trees die, the natural inference on the part of the pupils would be that the work done by them in caring for the young trees was useless. It should therefore be the endeavor of each school to raise but a few trees per pupil, but to grow these successfully and to transplant all of them with the smallest possible loss to permanent sites on the school grounds or about the homes in the community for shelter, timber, or ornamental purposes. This aim must be impressed upon the pupils if the lesson of the value of forest trees is to be taught. If only one tree per pupil is grown, but every one safely transplanted to a permanent site where it may grow into usefulness and beauty, the work of the nursery will be infinitely more satisfactory than if hundreds of seedlings are produced and many of them allowed to perish.

Cooperation Between Schools.

It will add greatly to the pupils' interest in the tree nurseries if schools located in different parts of the country exchange supplies of tree seeds. It is suggested, therefore, that each school endeavor to communicate with some other school situated in another locality, and by exchange secure some new varieties of tree seeds and introduce these new and unfamiliar trees into the community. It will be much more interesting for the pupils to watch the growth of a strange type of tree than merely to produce those with which every one is already familiar, and, should the experiment be successful, these new trees may be made to serve a useful purpose if they are awarded as prizes for faithful work done by individual pupils. Care must always be taken, however, not to experiment too much with trees which are not likely to thrive because of the climate or other local conditions.

Care of the Nursery During Vacations.

One of the most difficult problems which the school will have to solve is how to care for the nursery during the summer vacation. It is necessary to leave the young trees which were planted in the spring, to take care of themselves through the hot months of July and August until school opens again in September. Some means must be devised to protect and care for them during this time. Just how this will be accomplished depends largely upon the ingenuity of the teacher and upon local conditions.

It is evident that some sort of an organization on the part of the pupils whereby they shall voluntarily assume the duties of caring for the nursery is infinitely more desirable than any other plan, because it will insure the continued interest and attention of the school to its project. No definite outline of the exact form which this organization shall assume is possible in this bulletin, because of the varying conditions surrounding different schools; but there are certain things which it must accomplish in order to serve its purpose successfully. Provision must be made for the regular cultivation of the seedlings by hoeing and weeding once or twice each month, or oftener, during the summer. They must, as a rule, be watered with more or less frequency, depending upon the season. If the site of the seed bed is exposed to trespassers or to the depredations of animals, it must be protected by fencing. All this must be done thoroughly and without fail or nothing but disappointment will come of the undertaking, and the resulting discouragement will be worse than if nothing had been done.

How to accomplish these ends will be a problem which each school will have to work out for itself. Possibly one solution would be the organization of a "forestry club" composed of volunteer "forest rangers" whose duties shall be the protection and care of the trees, just as the government officers look after the trees of the national forests. These clubs may be the means of doing much good through the interest which they arouse in general forestry, as well as through the practical benefit derived from the nursery itself. The clubs could also arrange for an exchange of supplies of tree seeds and even of nursery stock, thus doing exactly the same work that commercial nurseries undertake in supplying new varieties of trees suitable and desirable for the community.

Choosing Ground for the Nursery.

The bed in which the seeds are to be planted should be located on ground which is well drained. Level or gently sloping ground should be selected, for if it is too steep the soil may be washed away. If possible to secure it, ground which has been under cultivation for a year or more and which is well pulverized is better for the purpose than new ground. Sometimes the use of such ground can be secured on the edge of cultivated fields or gardens bordering on the school grounds.

Care should be taken to select a site away from the playground, where it will not be trampled upon. Unless the plat of ground to be used is protected properly in this respect, all work done may be useless.

If there is any choice to be had as to the kind of soil, a loose, sandy loam should be chosen rather than clay. In the majority of instances, however, schools will have to be content to put

whatever soil is available into as good condition as possible under the circumstances. It is well to have the seed bed in a place where it will not be exposed too directly to the sun. If possible, it should have a partial protection by being situated to the east or north of a group of trees or buildings.

Preparing the Soil.

Unless the land to be used is very rich and in good condition for the nursery, it is well to enrich it in the fall with well-rotted manure. The ground should then be plowed or spaded deeply and left without further preparation during the winter. In the spring, as soon as conditions will permit, it should again be worked over with a spade or plow and thoroughly pulverized by raking and harrowing, until all clods, stones, and rubbish have been removed. The better the condition of the soil the better the results will be. Too much attention can not be given to the preparation of the soil.

Wrapping and Packing.

Uprooted seedlings suffer more or less when exposed to the wind and sun if only for a few moments, so great care must be taken to protect them. Sunny and windy weather should be avoided when transplanting trees, and the seedlings taken up only on cloudy, damp days. As they are lifted from the soil they should be laid in piles, roots together, and the roots immediately covered with a few shovelfuls of moist earth until they can be wrapped in wet burlap or coarse cloth of some sort. If they are to be sent any distance the roots of the trees should be carefully packed in damp moss or chaff, and the whole securely wrapped with the burlap.

Cultivation of the Nursery Bed.

The trees transplanted to the nursery beds should be cultivated frequently, but not by deep plowing or spading, which would injure the roots. The weeds must be kept down and the ground kept loosened to a depth of 2 or 3 inches. The care of the nursery stock is in every way similar to that of the seedlings in the seed bed.

Planting of School Grounds.

The final disposal of the trees grown in the school nursery is a matter of much importance. The success of the whole undertaking will depend largely upon how many strong, desirable trees can be saved and planted in permanent sites where they will benefit the school or the community.

Naturally, the first location which suggests itself as a suitable planting site is the school ground itself. Many school sites are without trees of any sort. Others are filled with trees of unde-

sirable species which can be replaced by better ones. Almost without exception school sites can be improved by judicious tree planting.

Before beginning to set out the trees a detailed planting plan should be prepared. This should show the locations of the buildings and features of the school ground which will affect planting, and should show specifically where the trees are to be planted. This plan should provide a definite scheme to be followed in the decoration and protection of the grounds and should be carefully worked out and as carefully observed. No specific directions for such a plan can be given here, but the following general rules should be observed:

(1) Sufficient space should be first of all set aside for a playground and no trees planted where they will interfere with this. A very desirable feature is to provide an open lawn directly in front of the building.

(2) Group the trees in masses as much as possible instead of scattering them singly. This will give a better effect in beautifying the grounds and afford better shelter.

(3) Avoid planting the trees in straight, formal rows. Plant in irregular groups, or along curved lines as much as possible. A shelter belt along the rear and possibly the sides of the grounds is desirable, especially along the north side, or the sides from which the most storms come.

Distribution Among Pupils for Home Planting.

It is probable that if the trees grow well in the nursery and are of desirable species, there will be a demand for them on the part of the children or their parents for planting about their homes. As elsewhere suggested, especially desirable young trees of new or rare species may be awarded as prizes to those pupils who have shown the greatest interest in the nursery or have been most faithful in their work. The awarding of these prize trees might well form a very appropriate exercise for an Arbor Day program. When trees are to be taken to the homes of the pupils, special care must be taken to see that they are properly wrapped and packed, and the roots kept moist until transported to the final destination. Pupils should be instructed to plant the trees as soon as they are unwrapped.

Making a School Woodlot or Forest Plantation.

In some localities it will be possible for the school to perform a service to the community and at the same time put into practice one of the most important lessons of forestry by using the nursery trees to reforest some tract of land from which the timber has been cut, or to establish a practical woodlot on some piece of unused land. Very frequently there will be found in the vicinity of the school hillsides which are badly eroded, and the

owners would be only too glad to have this erosion checked by the planting of forest trees on the slopes. Possibly a small field or lot which has been sown to ordinary farm crops so long that the soil is worn out will be available. Trees will grow well in such soil. Perhaps a small point of land, cut off from cultivation by streams or deep ditches, can be found; or some farm owner of the neighborhood will want to start a woodlot or plant a shelter belt on his place. In any of these cases the practice of actual forestry afforded by this means of disposing of the trees gives one of the best possible solutions of the problem. The results will be self-evident and hence will be the source of much pleasure and pride to the school. Another advantage is that small seedlings, one or two years old, may be used for establishing forest plantations of this kind, whereas larger trees are preferable for planting for shade or ornament.

It will be extremely desirable, if the school has opportunity to establish a plantation of the sort mentioned in the preceding paragraph, to secure expert advice as to the best methods of planting and caring for the trees.

Sale of Nursery Stock.

Young forest trees, suitable for planting in woodlots or forests, can frequently be sold for good prices. Cities and towns may want them for street and park planting; or the farmers of the vicinity may purchase them for planting about their homes. It will frequently be possible for the school which has had reasonable success with its nursery to sell the trees and derive considerable profit from this source. If there is a commercial nursery in the vicinity the stock of trees may be sold to it. This method of disposing of the trees will not give the satisfaction resulting from seeing the trees grow to maturity in the woodlot or school grounds, but most schools can make good use of any funds derived from the sale of the trees.

COTTON GROWING IN THE WEST INDIES.

In most of the cotton-growing districts of the West Indies, sowing will have been completed by the end of last month, while, in some cases, the seed will have been planted as early as May. In all cases, the seed should have been carefully selected and disinfected, either by the planter himself or by the agricultural authority in the island; in some cases, this will have been done, under expert supervision, at the ginners from which it was purchased. Where the cotton has not yet been sown, great care should be taken to ensure that proper selection and disinfection of seed to be employed has been carried out. In connection with the disinfection of seed, it may be useful to remind the grower that the strength of the corrosive solution to be used for

the purpose is 1 part of corrosive sublimate in 1,000 parts of soft water or rain water, that is 1 oz. of corrosive sublimate to 7 gallons of water, or 1 lb. to 100 gallons; where the water is hard, and rain water is not obtainable, the solution should be slightly stronger. The best way to make up the solution is to dissolve the corrosive sublimate in a suitably small quantity of water, and then to add this to the larger quantity of water that is required to bring the solution to the proper strength. As is well understood, the tubs for disinfection should be made of wood, and should have been allowed to stand for a few hours, filled with some of the solution, before they are used for treating the seed. This is then poured away, freshly made solution added, and then the seed is stirred into the solution and left for ten to twenty minutes.

In planting, two or three seeds are usually placed in holes about 2 feet apart, in rows about 4 feet apart. This is a distance that has been found generally useful, though in any particular instance, the nearness of the plants to one another will depend on the nature of the soil: in poor land they will be farther apart than in rich soil. A fortnight after sowing, provided that the plants have made reasonable growth, they are thinned out, so as to leave one in each hole. Where for any reason, such as the lack of rain after sowing, the seeds have not germinated, the empty holes should be supplied by sowing fresh seed; it is of little or no use to attempt to do this by transplanting.

A short time after the plants have been thinned out, they should be moulded up, in order to enable them to resist the wind, and this should be done again when they are somewhat more than a foot high. In using the hoe for moulding up, the laborers should be careful not to injure the plants, particularly where they are likely to be attacked by black arm or red maggot.

The cotton should be weeded regularly throughout the season, until the bolls begin to open, and during dry weather it should be given light cultivation, where this is feasible, in order to maintain a soil mulch for the conservation of water. In this weeding and cultivation the same precautions must be taken against injuring the plants as are indicated above for the first weeding.

The chief matter to be realized in cotton-planting and cultivation in the West Indies is that the plant requires continuous attention—an attention almost as intimate as that needed in what is sometimes termed garden cultivation. It is only by fulfilling this requirement that an adequate watch for insect and other pests can be maintained, and the receipt of a profitable return may be ensured.—*Agricultural News*, July 8.

FOWLS FOR TABLE.

It is a common practice to take fowls from the yard, kill them right away and have them cooked and on the table in a couple of hours. Attention to a few little hints will greatly improve the meat. First, the fowls meant to be eaten should be put in a coop a week before, the coop should be kept clean, these fowls should be fed as much as they can eat of soft food, no hard corn, corn-meal, banana, cocoanut, scraps of any kind, with plenty of water put in fresh every day. The particular fowl meant for the table next day should not be fed for 12 hours before killing, and even in the hot weather can be killed the evening before and hung up in a cool place. At the latest it should be killed 12 hours before eating.

THE CULTURE OF COFFEE.

First of all, I must explain that nearly all I know of this subject I have learnt from my father, who is an old cultivator and who is alive today. He is an oldtime cultivator who is very successful with his coffee. I, myself, although not giving all my time to cultivation, am very much interested in it, but the piece of coffee that I now have was not planted by me, but was an old, thrown-up cultivation which I bought seven or eight years ago, supposed to have been bearing for over fifty years. There are trees there that no one can reach save they climb them, they are so tall and the stems are so thick.

After acquiring this piece of land, I did not think much of the coffee, but paid attention to the grass because it is a hobby of mine to keep horses, as I am a special lover of that animal and I wanted the grass for feeding my stock. However, I planted yams through some parts of the coffee, and I found that where coffee trees were near where I had been digging the yam hills, they revived very much and began to bear quite heavily. On noticing this I put myself to the task of cleaning out the whole of the coffee, which was full of grass and weeds. This being done, I found the trees were far too tangled and thick; I therefore paid attention to letting in air by gradually cutting the bad trees out so as to leave the other trees standing as regularly as possible and to let air in all round and above. At the same time I planted catch crops of corn and peas through the trees so as to be forced to keep the coffee clean and get a little return. I also paid regular attention to the young shoots which came up from the coffee, selecting them so as to regulate the shape of the trees. There was a lot of work in this, but I set myself to ask, making the last hour I spent on my field the days I had been regulating the young shoots. I cannot at this stage be a matured piece or a pruned one, but I hope soon to get on to this stage. Owing to my coffee being enough

room and sufficient air, the berries are always well developed if they are favored with good rains at all, but on the contrary, where trees are crowded and thick the berries are lighter in weight. The coffee tree I find not only deep-rooted but a superficial feeder as well, and I am sure that mulching and manuring will greatly improve the weight of the coffee. When the coffee trees are ripening, I would advise:—(1) That they should never be stripped, but should be stem-picked. (2) None but the cherry ripe berries should be taken off for pulping. (3) They should be pulped before they ferment. (4) The pulped berries should be fermented without water overnight and then washed as clean as possible in the morning. (5) They should then be drained. (6) The berries should be spread out as thin as possible on a barbicue, and should it rain before they are properly quailed, they need not be taken up. After they are quailed they must never get wet again, nor should they ever be put out on a wet barbicue. The drying should be continued till "quailed," then they should be put out on alternate days and never put up closely until all fermentation is off, which can be known by pushing the hand down to the bottom of the receptacle without encountering any warmth. (7) After this, the berries should be occasionally thrown out to keep them hard for milling, when they should be in a bone-dry state. The berries should then be sunned again. (8) Before pulping, the pulper should be well set so that there will be few bruised and broken berries, as these would spoil what would otherwise be a first-class sample.

My ambition to be a good coffee grower began with the first Porus Agricultural Show, where I competed with others in the locality and the surrounding neighborhood. I was then first and second in the clean and parchment coffee. I was then further stimulated by the *Daily Telegraph* competition open to the whole island. I took first and special in December, 1909. The next Porus Agricultural Show again brought me first and second prizes in settlers classes both in clean and parchment. At Knutsford Park Show last February, I again competed against the whole island, and I was again successful with the second and third prizes in clean coffee and first in parchment coffee. At Bybrook Show in March I was first and second in clean and second and third in parchment. I also took second in clean and parchment at the last Kendal Show, but I have not yet received the prize money.

Now, I am asking those cultivators present and well interested, never to treat too lightly the small things of life and to do everything thoroughly that needs doing.

The price of coffee will yet become good. I have often predicted this, and I have been satisfied to grow coffee with this hope, and would ask all of you who are coffee cultivators to do your best with this product that will help our little town and district and the island to rise to prosperity again.—W. A. MORGAN, in Journal of the Jamaica Agricultural Society.

INFLUENCE OF TIME IN MILKING.

It is commonly supposed that the milk produced by cows in the morning is larger in quantity and poorer in quality than the milk produced in the evening.

This fact is due to the longer period which elapses between night and morning milking, and the shorter period between morning and night. It has been shown, however, that as the periods between the milkings approximate in length, so does the milk approximate in quantity and quality. In a public test made by a public authority ten cows were divided into two lots of five, and specially milked for eighteen days. Five cows were milked at 8 a. m. and 4 p. m., and five at 6 a. m. and 6 p. m.

The result was precisely what is usual. The cows milked twelve hours apart gave nine pints of milk daily more than those which were milked at varied intervals. Again, the milk produced after regular intervals was richer than the morning's milk produced at unequal intervals, for it contained 4 per cent. of fat, as against 3.6 per cent., and was therefore 1 per cent. above the standard.

If the same results were obtained in general practice, the question of the standard would be settled once for all, for it would remain entirely in the hands of the owners of the cows, although they would probably complain that business necessitated milking at unequal periods.

Naturally, the milk of the evening was the richest. We refer to that drawn at four o'clock, for, speaking roundly, the shorter the interval after the morning's milk the richer the milk. In both cases, however, the solids other than the fat of the milk were practically identical.

The results, which simply confirm many similar experiments in the past, are much too important to be put to one side. They plainly show that the objects of those who are constantly agitating against the milk standard of 3 per cent. of fat are unwarranted.

If men insist upon milking cows with a long interval and a short interval, instead of at equal intervals, they must expect difficulties to arise.

For instance, if cows are milked at six in the morning and six in the afternoon, the latter milk will be rich, and the former systematically poor by comparison.

The consequence is that on occasion the morning's milk may be condemned, and the standard also condemned, even though the owner of the cows or the milkman who produces the milk.

It is contented that under normal conditions healthy herds produce milk containing less than 3 per cent. of fat. If milk is milked twelve hours apart the quality would rise in

so marked a manner in the morning that, so far from there being any danger of its being below the standard, the standard itself might be raised with perfect safety to the producer and with great advantage to the public.—*Farm, Field and Fireside*.

OF INTEREST TO BEEKEEPERS.

*An Important Government Decision that Indirectly Favors the Honey Business—Saccharin Barred from Foods
After July 1, 1911.*

(From Gleanings in Bee Culture.)

Two or three years ago we had considerable to say on the subject of saccharin—a product of coal tar, and hence poisonous as a sweetening for jellies, jams, beers, and soda waters. We explained to our readers time and time again, that any product of coal tar, when used in food, was injurious. The fact that it is 300 times sweeter than cane sugar makes it very cheap; and the manufacturer of sweet pickles, jams, and jellies, and the brewers, have been using large quantities of it in place of the more expensive sugar. We have been told that a large percentage of the soda water fountains have been using the product.

We have been hoping for some years that there would be a government decision that would bar the use of saccharin; and now our dear Uncle Sam has given a fair warning that on and after July 1 its use must be discontinued. This is what he says:

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,

Washington, D. C., April 28, 1911.

The Secretary of Agriculture has today issued a decision, based upon a finding of the Referee Board of Consulting Scientific Experts, which forbids the use of saccharin in food on and after July 1st next. The decision is under the Food and Drugs Act, and will prohibit the manufacture or sale in the District of Columbia or the Territories of foodstuffs containing saccharin, as well as interstate commerce in such foodstuffs. The finding of the Board is the second since its creation, and is regarded as very sweeping, inasmuch as the decision affects more than thirty different classes of foods. Some of the articles affected are soft drinks, sweet pickles, jellies, and jams, and, in some instances, beer.

The decision as promulgated is signed by the Secretary of the Treasury, the Secretary of Agriculture, and the Secretary of

Commerce and Labor, in order that the regulations embodied in the decision may be put into effect. The decision follows:

"At the request of the Secretary of Agriculture, the Referee Board of Consulting Scientific Experts has conducted an investigation as to the effect on health of the use of saccharin. The investigation has been concluded, and the Referee Board reports that the continued use of saccharin for a long time in quantities over three-tenths of a gram per day is liable to impair digestion; and that the addition of saccharin as a substitute for cane sugar or other forms of sugar reduces the food value of the sweetened product, and hence lowers its quality.

" Saccharin has been used as a substitute for sugar in over thirty classes of foods in which sugar is commonly recognized as a normal and valuable ingredient. If the use of saccharin be continued it is evident that amounts of saccharin may readily be consumed which will, through continual use, produce digestive disturbances. In every food in which saccharin is used, some other sweetening agent known to be harmless to health can be substituted, and there is not even a pretense that saccharin is a necessity in the manufacture of food products. Under the Food and Drugs Act, articles of food are adulterated if they contain added poisonous or other added deleterious ingredients which may render them injurious to health. Articles of food are also adulterated within the meaning of the Act if substances have been mixed and packed with the foods so as to reduce or lower or injuriously affect their quality or strength. The findings of the Referee Board show that saccharin in food is such an added poisonous or other added deleterious ingredient as is contemplated by the Act, and also that the substitution of the saccharin for sugar in foods reduces and lowers their quality.

" The Secretary of Agriculture, therefore, will regard as adulterated, under the Food and Drugs Act, foods containing saccharin which, on and after July 1, 1911, are manufactured or offered for sale in the District of Columbia or the Territories, or shipped in interstate or foreign commerce, or offered for importation into the United States."

We regard this as one of the most important and far-reaching decisions that have been rendered by the general government for a long time. Dr. Wiley, of the Bureau of Chemistry, and the time-honored champion of pure food, has long opposed the use of saccharin. The fact that he is now supported by his associates, and by those higher up, is a matter of no little importance. It is going to mean a big boost to the bottled-honey business that has heretofore had to compete with saccharin-sweetened jellies and jams, and some glucosed products that could be sold for less money than honey. It will mean, too, that comb honey will also have a larger sale, although it has never belonged to the class of cheaper products.

In spite of the corruption in high places, in spite of the graft and wholesale bribery in some of our legislatures that have been revealed lately, the world is moving to higher and better things. It is moving, because graft will be no longer tolerated. The legislators who had a price for their votes will be relegated to the past. When that day comes, we shall expect that all the injurious patent medicines, as well as all medicines containing large percentages of alcohol, and all injurious food products—injurious because they contain preservatives and injurious flavorings—will be barred from the stomachs of our American people. The day is almost here now.

Bees and Poultry.

It may be interesting to our senior editor to hear that he is not the only poultry enthusiast connected with *Gleanings*, but that we are also "in the ring of poultry cranks." To tell the truth, keeping poultry works well with bee-keeping if the person so engaged understands the management of the combination. We have become entangled in these two lines of work for two reasons: First, because of the old saying, that a busy business man should have some kind of hobby on which to spend his spare time, and thus divert his mind from his cares. We have always suggested that there is no other side line like bee-keeping for busy men. But why have we never thought about a hobby for the busy business bee-keeper? It might be said that for him "more bees" would be a remedial measure; but would not that make his business life still more strenuous? For this reason we have made fancy poultry-keeping our hobby, and we like it immensely, as we get a lot of fun out of it.

The second reason has been the fact that, aside from the pleasure that we have gotten out of the hobby, we have found this new venture so remunerative that we have had to increase our poultry business to such an extent that it is really not a hobby any longer. The consequence is, we now have two businesses to look after, and will continue them as long as they work as well side by side as they have. Since most of the poultry work is early and late in the day, while the bee work comes in between these two periods, the combination works very nicely; and as long as we get our share of profits from both, as well as a lot of real pleasure, why should we not combine them? Of course, we are well aware of the fact that this is a time of specialty in all lines of work, and this is what we are trying to adhere to even now. Can we do it? We are trying to make a specialty, and strictly so, with our bees; at the same time we are trying to do the same with the chickens. Can we?

The Value of a Good Armor.

Time and again we have been in position to show that it pays in the long run to be well armored for extensive work in the

apiary, especially if a great deal is to be accomplished. We have often had arguments presented to us to show that it is not so necessary to be protected absolutely by a good veil and by gloves. While all this advice may work very nicely with a few colonies of very gentle bees, we have not been able for many years to work our own apiaries in that manner. While we did not believe in wearing even a veil during the first eight years of our bee-keeping career, bearing many a painful sting unnecessarily, we do not work in the apiary without gloves. The veils we have adopted are much more substantial than the flimsy makeshifts with which we were satisfied at first. These are now made of wire cloth, very much like the Alexander veil, but so that they can be worn with a hat—a thing that we must do here in the South. With such a veil, gloves on our hands, and every thing else bee-tight, we have stood our ground when "the other fellow" was retreating from a sudden onslaught. Of course, we realize that our bees are much more vicious than ordinarily. This is generally the case where they are handled in a hurried fashion. In this respect we believe they are very much like the Coggs hall kind of which we used to read so much; and we venture the assertion that, where bees are handled by lightning operators to any extent, they are not the gentle kind that can be handled without veils and gloves.

It has been argued that slower manipulations should be practiced in preference to the rapid lightning methods of some of our most extensive bee-keepers; but we have found, after trying this, that, unless we got a more lightning-like move on us, we were not able to accomplish as much. And in our mind this is the only real business way of wholesale bee-keeping—a system whereby the maximum amount of work can be done in the shortest length of time, by which every cut-and-dried short-cut and labor-saving method can be put into play with good results.

THE IMPORTANCE OF THE FARM WOODLOT.

BY PROFESSOR J. A. FERGUSON.

(*From the Penn State Farmer.*)

We often fail to realize the value of farmers' woodlots. To the country at large their importance will increase as the supply of saw-timber becomes gradually less. There is today more land covered by farm woodlots than is owned by the National and State governments combined. Of the eight hundred and fifty million acres of forests which formerly covered our country but two hundred million acres remain. Since we are cutting our timber faster than it grows, the time is not far distant when the supply of sawing into lumber will be difficult to find. It is estimated that in fifteen years the greater part of the hardwood in the East will have been cut, and that we will then face a famine in saw log. When that time comes the timber con-

tained in the two hundred million acres and over of farm woodlots will form a supply of saw logs that will last this country for many years.

The woodlot is not only of value to the country at large, but it is of special value to the farm to which it is attached. In many regions it is a necessity. It has been said that every farm should have one-eighth of its area in a woodlot, which should furnish the farm with fuel and posts and enough saw logs to supply what lumber is needed for farm use. It should also furnish products for sale to help pay for taxes and other expenses connected with the woodlot. A woodlot should be a source of income as well as any other portion of the farm. It should furnish this amount of material indefinitely, without injury to the woodlot and without lessening the forest capital.

There are three reasons why farmers' woodlots are not producing this amount of material: they do not contain the right species of trees, there are not enough trees grown to the acre, the woodlot is not sufficiently protected from its enemies.

In forestry the aim is to make use of those trees alone which will give the product desired in the shortest time. Among the four hundred or more species of trees which are native to this country only a comparatively few are of any use in forest management. It should be the aim of every woodlot owner to determine what trees are best to grow in his woodlot. The owner usually relies too much on nature to make the choice of what trees shall grow. He cuts trees here and there and gives no thought as to what species shall grow in the place of those removed. As a result nature fills in the gap with the tree that happens to get a start, whether that tree is a slow or a fast growing species, or whether the timber is of value for farm use or is a weed tree. It is just as essential to remove the weed trees from the woodlot as it is from the garden crop. Nature grows the plant or the tree that will the quickest respond to the conditions, and it usually happens that the weed is better able to survive than the more desirable plants. Nature is no more capable of making a proper choice of trees in the woodlot than she is capable of discriminating in a garden crop. If the farmer wants to grow certain species of trees in his woodlot, he can do so only by judiciously thinning and weeding out the undesirable species, so as to give the trees he wishes to grow the advantage.

It usually happens that when a tree is removed from the forest there are no young trees of desirable species ready to respond to the increased light and fill in the gap. It has been the custom to look on young seedlings as of no value. The farmer reckons the value of his woodlot only on the larger trees. He does not realize that the future of his forest depends on the young seedlings and saplings that come in under the older trees. He allows these to be destroyed by grazing or by repeated fires or even cuts them out, as he thinks to better his forest conditions. The result is

when a gap is made in the woods by the removal of a tree, there is nothing to grow up and fill in the vacancy, except weed trees that start easily, or else the ground becomes covered with weeds or a matting of grass that prevents by drying the upper layers of the soil the germination and development of seedlings from seeds. In such a case the only way to secure trees of the species desired is to plant them in the woodlot. Seedlings for this purpose can be purchased of nurserymen, or use can be made of seedlings of the right species found growing abundantly in other portions of the woodlot or the seeds of trees can be planted directly in the woodlot, or they can be planted in the garden and the seedlings grown for a year or two and then removed to the desired location.

The trouble with most farmers' woodlots is, there are not enough trees grown to the acre or else the woodlot is filled with useless trees. If from most of our woodlots the owner should remove the weed trees and those of the better kinds that are so ill-shapen or defective as to be of little value, there would be but few trees left to the acre. This condition has arisen from the general practice of constantly removing the better trees and leaving the poorer. If a tree is desired for cordwood the owner generally removes a straight thrifty tree, because it will split easily, rather than cut out an old gnarly, limby or defective tree. The result of this treatment is that the woodlot soon becomes filled with trees useless for any purpose on the farm and the owner wonders why his woodlot is running out. It is a common saying that a farmer cannot use his woodlot and maintain it in a thrifty condition. That this statement is so generally true is because of lack of thought and judgment in the selection of the trees to cut. The defective and illy-formed trees occupy space that better trees should occupy. Where they are allowed to remain year after year they soon become branchy and occupy the space several trees should occupy. Such trees should be removed and utilized as cordwood and in their place made to grow trees of the right species and form.

The kind of tree we desire to raise in the woodlot is one with a long, clean bole that will yield a large amount of clear material. A tree growing in the open produces branches that clothe a tree often to the ground, the result is a short tapering bole full of knots and difficult to split. A tree grown in a dense forest produces a bole free of limbs. This is because as soon as a limb is deprived of light it dies and soon falls to the ground. This is called natural pruning. In forestry the aim is to grow trees closely enough together so as to produce this natural pruning. Another result of growing trees closely together is the production of a long bole. This is because of the competition for light between trees so planted. Inasmuch as they cannot spread their crowns so as to get the desired amount of light, it is necessary to seek the light above. There is a race between the trees for the light resulting in the long boles so much desired by lumbermen. In most of our woodlots so few trees are grown to the acre that this natural prun-

ing and this quick height growth does not take place. Enough light filters down between the crowns to keep the side branches alive and the result is limby bole, producing knotty wood. Another result of not growing trees closely enough together is the production of a rank growth of weeds, berry bushes and grasses which absorb the moisture and nutriment from the upper layers of the soil to the detriment of the forest trees.

One of the principal reasons why farmers' woodlots are not producing the amount of wood they should is because they are not protected from their enemies.

One of the worst enemies to a woodlot is the owner himself. By his lack of judgment in the selection of trees to cut, always removing the best tree he can find, he fills his woodlot with useless trees. He grows so few trees to the acre that the ground becomes clothed with weeds and grass. He exercises no care in the removal of trees, breaking neighboring trees and destroying the undergrowth. He gives no thought as to what trees shall grow in the place of those removed. By allowing continuous fires and grazing he utterly destroys conditions necessary for the proper growth of forest trees and jeopardizes the future of his woodlot by the destruction of young seedlings.

Fire passing through a woodlot consumes the leaves and other vegetable debris that has accumulated. This vegetable material when allowed to remain acts as a mulch and by its decay furnishes food to the trees and forms humus which tends to retain moisture and keeps the soil light and fresh. If it is removed the soil is exposed to the sun and rain, causing it to become dry and hard. Fire kills the small seedlings and scorches the larger trees, often killing the cambium or growing layer just beneath the bark. The trees thus become weakened and exposed to the attacks of insects and fungi. A thrifty tree is seldom so attacked.

Grazing produces a similar effect by packing the ground, by killing small seedlings by browsing and trampling, and by gnawing the bark a place of entrance for the spores of fungi is formed. It has been said that trees and cattle cannot be grown successfully on the same ground.

Insects and fungi do immense damage to forest trees. Where trees have been weakened by fire or grazing, they are especially liable to such attacks. By maintaining conditions favorable to the best and most thrifty tree growth, by removing weak and defective trees instead of allowing them to remain and become diseased and so a menace to the more healthy trees, the owner of the woodlot can, in a large measure, prevent the attacks of these enemies. Trees decay because of the growth of fungi in the wood. These low forms of plant life gain entrance through wounds in the bark caused by breaking of limbs, gnawing by animals and through wounds caused by fire. Many trees in the woodlot can be found rotten at the base where spores of fungi have found entrance through areas scorched and killed by surface fires. If the bark

of a tree is kept intact and the fungi kept out, there is no reason why a tree should decay.

Our woodlots are becoming of greater and greater value as the supply of sawtimber becomes less. The time is not far distant when the timber contained in the woodlot will be a valuable asset to the owner. It should be the duty then of every owner of a woodlot to study the best conditions of tree growth, to determine the best trees to grow in the woodlot and to protect the trees from injury, in order that the timber may be in such a condition that it will yield valuable returns in the future.

VEGETABLES.

People cannot be healthy, cannot have good blood without using green vegetables. These are not so valuable for the nutrition they may contain as for the salts and acids in them which act as tonics and blood purifiers. People will fly to the chemist's shop and buy medicines said to contain iron and phosphorus or some secret elixir. This is mostly waste of money and many of these patent medicines are injurious and contain morphine and alcohol, at an enormous price. The family can best get their iron in that common and unappreciated vegetable kalaloo or spinach, and in young beans and peas used in the food commonly called "French beans." Then how few know that the shoots of young cocoes make excellent spinach, or that the leaves of young carrots make excellent flavoring for soup. Use peas and beans as the basis of soups, and put in them as many green vegetables as you can get. Tomatoes are easily grown and are better for the liver than medicines. They also contain iron. Here is a list of foods showing what elements they are rich in:

Protein.	Carbohydrate.	Fat.	
Whole milk	All cereals and cereal	Milk	
Skimmed or separated	foods	Cream	
milk	Starchy vegetables, as	Butter	
Buttermilk	potatoes	Fat meats	
Eggs	Sweet fruits	Meat fats	
Meat	Peas and beans	Egg yolk	
Fish	Some nuts	Nuts	
Cheese		Vegetable oils	
Peas and beans			
Nuts			
Oatmeal and wheat			
Foods rich in salts (mineral matter) :			
Iron	Potassium	Phosphorus	Calcium
Dried beans	Dried beans	Dried beans	Milk
Dried peas	Dried peas	Dried peas	Dried peas
Whole wheat	Whole wheat	Potatoes	Dried beans
Spinach	Oat meal	Parsnips	Celery
Raisins	Egg yolk	Cabbage	Cabbage
Prunes	Beef	Turnips	Parsnips
Green beans	Milk	Prunes	
Fresh meat			
Eggs			

SCHOOL GARDENS IN JAMAICA.

(From Proceedings of the Jamaica Agricultural Society.)

Mr. Esson said the time had come when something should be done with regard to school gardens—to make these of some practical value in the agricultural advancement of the island. He felt they were losing a valuable opportunity of getting at the children in a more sympathetic way than they were doing at the present time. That the agricultural instructors were doing good work nobody could deny, but the value of their work would be considerably enhanced if arrangements were made by which they, the instructors, would go into the school garden and teach the children from there.

Mr. Cousins said this matter had been under consideration for some time. He thought arrangements could be made with the Educational Department by which the Instructors would be able to devote more time to the school gardens, and believed in the next few months something practical in the matter would be done.

The President pointed out that a great deal of effort had been made to improve the teaching in school gardens. As many teachers as would come, were brought up to Kingston once a year and given such agricultural instruction as was possible in that limited period. Of course, these things took a long time because they had to take men already out as teachers, bring them now again, and try to teach them a new subject, and they could not expect that everybody would take interest in the subject or be successful. The number of school gardens had increased immensely within the last two years, and the conditions in which the gardens were kept were also much improved, and he thought the government had reason to look forward hopefully to future developments.

Mr. Esson said he would like to see the school gardens as distributing centres for economic plants, etc.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Kon, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

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Mr. W. M. Giffard has been selected by the Board of Agriculture and Forestry to conduct the campaign for the eradication of the Mediterranean fruit fly. As one of Hawaii's leading amateurs in horticulture and arboriculture, long a keen student of entomology, having also had many years of experience in large business affairs, Mr. Giffard is one man in a thousand for the task. The Board is to be congratulated on his acceptance, also upon his prompt taking hold of the work, he having begun to plan a course of action immediately on his return from a visit to the island of Kauai.

Manufactures in Hawaii, of which the latest census report, covering the year 1909, appears in this number, of course mainly consist of the product of the sugar plantation factories. From about the year mentioned fruit and fruit juice preserving works, also factories preparing coffee and fiber for market, begin to add substantially to Hawaiian manufactures, and cotton may be made soon to increase the tale, providing its new pioneers in these islands do not allow themselves to be beaten by pests that have been subdued in other countries. Agriculture is as closely related to manufactures in Hawaii as mother to child, and this is true to a further extent than in the preparation, wholly or partly, of agricultural products for the consumers. Honolulu has iron-works that owe their development more to the sugar industry than anything else, which for some time have had no superior competitors anywhere in furnishing sugar factories to other countries.

From C. M. Winslow, Brandon, Vermont, secretary Ayrshire Breeders' Association, has been received Ayrshire official Records No. 6, September, 1911. The publication is a small card folio. It contains a summary of each average annual yield of 362 cows and heifers, grouped as two year olds (54), three year olds (31), four year olds (15), mature (76) and cows and heifers (186), in twenty-nine separate reports. The purpose of giving each average is stated as being to show the uniformity of averages, the short introduction reading thus: "We have always claimed that the value of a dairy breed should be judged by the general average of dairy product for that breed and not

by phenomenal records of individual cows. We have also claimed that the value of a single cow should be determined by what she will yield for a year rather than for a week or a month, since she must be cared for and fed for the whole year, and only on that basis can her profit be determined."

The animals admitted to advanced registry are five in the two year old form, four in the three year old form, two in the four year old form and fifteen mature, and their averages respectively are as follows:

	Lbs. milk	Lbs. fat	Lbs. butter	% fat
Two year old class.....	7,454	296.60	346	4.11
Three year old class.....	9,663	386.62	451	4.07
Four year old class.....	8,613	356.57	416	4.27
Mature cow class.....	10,186	377.60	440	3.77
Whole, cows and heifers..	8,979	354.35	413	4.05

Mr. S. T. Starrett, the market superintendent appointed under the legislation of 1911 to promote the prosperity of homesteaders, is diligently pursuing his duties. He is visiting one district after another throughout the islands, taking note of the products most adaptable to profitable raising in every locality visited. Thus far his general advice has been communicated for the most part informally through the newspaper press, but he gives instruction personally, meanwhile, to the homestead cultivators as he passes through the country. When he has thoroughly covered his field work, Mr. Starrett will no doubt sum up his findings with recommendations in form to serve as a foundation for scientific development of diversified agriculture in this Territory. Heretofore this great cause has been advanced in a practical way wholly upon a basis of any man for himself. With a trained expert now at the directing helm, let us hope for coöperative effort and system, both in cultivating and marketing such products of the soil as are in constant need here and for which a demand can easily be created, where not already existing, in all the accessible markets outside. The trade returns show many natural products imported, at an aggregate cost of millions of dollars annually, which might certainly be raised in these islands. There are equally as many articles, peculiarly Hawaii's to produce, for which an unfailing demand obtains abroad. Let us buy less and sell more of what our climate and soil can abundantly yield. That is the way to bring about a more general diffusion of prosperity among the population of the Territory, as well as to gain and keep more population among which to have the prosperity diffused.

MANUFACTURES IN HAWAII.

(*Correspondence of The Forester.*)

Washington, D. C., October 17, 1911.—A preliminary statement of the general results of the Thirteenth United States Census of manufactures was issued today by Census Director Durand. It contains a statement of the statistics for 1909 for the noncontiguous territory, Alaska, Hawaii, and Porto Rico, prepared under the direction of William M. Steuart, chief statistician for manufactures, Bureau of the Census. The figures are subject to such revision as may be necessary after a further examination of the original reports. Following are the statistics for Hawaii:

Number of establishments.....	500
Capital	\$23,875,000
Cost of materials used.....	\$25,629,000
Salaries and wages, total.....	\$ 2,795,000
Salaries	\$ 686,000
Wages	\$ 2,109,000
Miscellaneous expenses	\$ 3,329,000
Value of products.....	\$47,404,000
Value added by manufacture (products less cost of materials)	\$21,775,000
Employees:	
Number of salaried officials and clerks.....	594
Average number of wage earners employed during the year.....	5,904
Primary horsepower	41,930

These figures exclude the hand and the building trades and the neighborhood industries, and take account only of establishments conducted under the factory system. Statistics for this census were not collected for factories having products for the census year of a value less than \$500, except that reports were taken for establishments idle during a portion of the year 1909, or which began operations in that year, and whose products, therefore, were less than \$500.

It is better to be a busy little body in this world than a little busybody.

"A word to the wise is sufficient," but a multitude of words are in vain to the foolish.

Do not put all your slicking-up on the front yard. There's a back yard, too.

Hard words are hardly ever necessary.

Stubbornness is misdirected persistence.

Straw hats show which way the wind blows.

Into the well which supplies thee with water cast no stones.—
Talmud.

Meet every stranger like a gentleman, even if he be an agent
selling wooden nutmegs.

In these days of muck-raking, the farmer who is able to rake
up a good compost heap stands to win.

"They say his wife makes \$5,000 a year with her pen." "I
didn't know she was a writer." "She isn't. She has a pig farm in
Iowa."—Chicago Record-Herald.

One of the things that gives the greatest pleasure where fleas
abound, says Practical Farmer, is knowing how to rid the premises
of these pests. Simply sprinkle the floor of the house and barn
with oil of penny-royal; also put a little on your clothing.

It isn't much fun to have the seat of one's trousers shingled with
a big piece of fly-paper. Won't the women folks please not lay
any of these papers in the chairs? Put 'em up somewhere, good
and high. Flies will find 'em just as well and it may save the
men folks a lot of embarrassment.

A SYLLABUS FOR A COURSE IN GENERAL BOTANY.

For use in the Secondary Schools of Hawaii.

The topics in the following outline are those of chief importance in a course in general botany. The subject-matter for each of these topics will be found in such standard texts as those of Bergen, Coulter, Bailey, or Hunter. "The Essentials of Biology," by G. W. Hunter with laboratory manual by Sharpe (published by American Book Co.) is especially recommended for this course, because these books include excellent sections dealing with the topics of zoology and physiology. Because of the use of these books a teacher's work may be done on each of the three large divisions of botany—plant anatomy, plant physiology, and plant morphology.

The following list of books is given as a guide to the school teacher. It is not intended to be exhaustive, but it is hoped that it will be found helpful. The books are listed in the order in which they should be read, and the most important ones are marked with an asterisk.

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pensive apparatus nor exhaustive preparation. The student should examine an abundance of living material, which can be secured at all times.

I. STUDIES OF THE PLANT AS A WHOLE.

- * 1. The plant a living organism.
- 2. Protoplasm and the structure of the cell.
- 3. Relations to environment—light, moisture, heat, food, etc.
- 4. Plant associations—hydrophytes. xerophytes, mesophytes, halophytes; arctic, tropic and temperate conditions.
- * 5. The flora of Hawaii, and of the Pacific islands.
- * 6. Man's control of the plant world—cultivated plants; forests; seaweeds; bacteria, etc.

II. STUDIES OF SEEDS AND SEEDLINGS.

- 1. Form of seeds; coats; explanation of markings on seed.
- * 2. Internal structure of seed—cotyledons, plumule, hypocotyl. Cotyledons as foliage leaves.
- * 3. Position of stored food; tests for food material; enzymes.
- 4. Early stages of seedling to show changes in parts of embryo. Method of breaking through the soil.
- 5. Later stages of seedlings.
- * 6. Work of government nurseries; Arbor Day.
- 7. Comparisons of structures and development of monocot., dicot., and polycot. seeds.
- 8. Germination and growth of seedlings as affected by moisture, temperature, air. Gases given off by seeds.
- 9. Uses of seeds.
- * 10. Seed testing; selective planting.

III. STUDIES OF ROOTS.

- 1. Kinds of roots—fibrous, fleshy, tap, etc.
- * 2. Internal structure—central cylinder, cortex, epidermis, root-hairs; functions of each part. The root-cap.
- 3. Origin of secondary roots; adventitious roots.
- * 4. Functions of roots—food, water, anchorage. Prop-roots, holdfasts.
- 5. Storage of food in roots. Parasitic roots.
- 6. Region of rapid growth; osmosis; relation to gravity.
- * 7. The soil solution; irrigation and drainage; fertilizers.
- 8. Nitrogen in the soil; relation to bacteria.
- 9. Plants as rock-disintegrators and soil-makers.
- * 10. Roots of economic importance.

IV. STUDIES OF STEMS AND BUDS.

- * 1. External characteristics of stems—bark; leaf-scars; nodes and internodes; lenticels; other markings.
- * 2. Internal structure—location, description and function of pith, wood, medullary rays, cambium, bast, cortex, epidermis.

- * 3. Pruning ; grafting ; cuttings.
- 4. The monocot. stem—rind, pith, bundles.
- 5. Course of sap through the stem.
- * 6. Specialized stem-types—rhizome, bulb, tuber, tendril, thorn, trunk, etc.
- 7. Adaptations of stem to environment—relation to sunlight, etc.
- 8. Relations of buds to branches, to leaves, to general form of plant.
- * 9. Structure of bud—leaf-buds, flower-buds, etc.
- 10. Protection of bud—from cold, from drying.
- 11. Time of bud-formation ; of bud-opening.
- 12. Storage of food in bud.
- * 13. Forestry—on mainland ; in Hawaii.
- 14. Economic value of trees—as timber ; as water-sheds.
- 15. "Conservation" and its significance.

V. STUDIES OF LEAVES.

- * 1. General structure and parts—blade, petiole, stipules ; venation ; simple and compound forms.
- * 2. Functions—photosynthesis, respiration, transpiration, assimilation. *The work of chlorophyll.*
- 3. Epidermis and stomata ; air-chambers ; mesophyll ; bundles.
- * 4. Arrangements of leaves. The light relation.
- 5. Modifications and special adaptations of leaves.
- 6. Response of leaves to special stimuli—touch.
- 7. The sun the final source of energy.
- * 8. Ornamental value of trees, bushes, vines, lawn.
- 9. Grass and herbivorous animals.

VI. STUDIES OF FLOWERS AND FRUITS.

- * 1. Structures and functions of parts of flower—ex. hibiscus.
- * 2. Pistil and ovules—location, structure.
- * 3. Stamens and pollen—location, structure.
- * 4. Protection of pollen : cross-pollination—wind, water, insects.
- 5. Germination of pollen ; fertilization ; development of ovule into seed.
- 6. Types of inflorescence.
- * 7. Identification of common flowering plants.
- 8. Flower gardens ; cut-flowers ; leis.
- * 9. Origin of fruit from flower.
- 10. Functions of fruit ; distinctions between seeds and fruits.
- * 11. Types of fruits—external and internal structures ; dry and fresh fruits ; pomes ; citrus fruits.
- 12. Adaptations for seed dispersal.
- * 13. Struggle for existence.
- 14. Plant breeding.
- 15. Economic value of fruits.

VII. STUDIES OF ALGAE AND FUNGI.

1. Spirogyra—habitat, structure, life-history.
- * 2. Yeast—cultivation, structure, reproduction, economic importance.
- * 3. Bread-mold—development, life-cycle, structure.
4. Bacteria—of air, water, milk; pathogenic forms; forms of industrial value.
- * 5. Marine algae—location, kinds, gross structure, colors, uses.
- * 6. Toadstool or mushroom—habitat, structure, life-cycle, uses.
7. Lichen—habitat, structure, life-history, symbiosis.

VIII. STUDIES OF MOSSES AND FERNS.

1. Peat and sphagnum bogs; formation of coal; fossil plants.
- * 2. A moss plant—general structure, reproduction, life cycle.
- * 3. A fern plant—general structure, reproduction; life cycle.
- * 4. Tree fern forests of Hawaii.
5. Fern-houses; care of ferns.

IX. STUDIES OF FLOWERING PLANTS.

1. Classification of flowering plants.
2. The monkey-pod tree or the hala tree—crown, leaves, flowers, fruit.
- * 3. Taro plant—corm, leaves, bud, flowers, life cycle.
- * 4. Coconut palm—trunk, leaves, flower, fruit; compare with other palms.
5. Carnation, lily, or geranium—cultivation, flowers, varieties, diseases.
- * 6. Sugar-cane—cultivation, stem, sap, flowers, varieties, insect enemies and diseases; relations to soil and moisture.
7. Important plants of Hawaii—indigenous; brought in by ancient Hawaiians; brought in since 1778.

Individual work with the compound microscope is not recommended; although the laboratory should have one or two good instruments for demonstration work. Emphasis should be upon gross structure, with special reference to function.

"Experiments with Plants," by Osterhaut (Macmillan Co.), is highly recommended as an aid in this course.

Whenever feasible *the plants should be studied out of doors, under natural conditions*. Field trips to gardens, nurseries, etc., are of great value, if well planned. The teacher will need to make out special outlines, to meet local conditions.

Thorough drill should be given in the correct oral and written presentation of important subject-matter. The field and laboratory work should include the making of simple drawings of important structures. All field and laboratory work should be carefully recorded, and all drawings should be carefully labeled.

A herbarium is not necessary. Use liberal quantities of fresh material. Pressed plants are not suitable for elementary work.

Demand scientific accuracy and precision in all work. Cultivate the investigative spirit. Teach, whenever possible, out of doors.

VAUGHAN MACCAUGHEY,
The College of Hawaii.

FARMERS' INSTITUTES FOR YOUNG PEOPLE.

(Extracts from Circular 99, office of Experiment Stations, U. S. Department of Agriculture.)

Out of every 500 young people in the country districts in the United States only one ever enters an agricultural college. Of every 100 rural and urban children only five ever reach the high schools, and only six ever go beyond the elementary schools. Ninety-four out of every 100 children therefore finish their education with the district school.

In order to reach the 499 out of every 500 rural boys and girls who can not go to an agricultural college, and yet in whom some attachment for and interest in rural life should be inculcated, there has developed quite generally a demand for the introduction into the rural schools of subjects that will educate in the direction of appreciation of rural life and its opportunities instead of confining the teaching as hitherto to studies that ignore the country and direct the scholar's attention to the occupations of the towns and cities.

The first effort to meet this demand was made by the town and city schools through the introduction of topics which later were all embraced under the term "nature study." The rural school began its work of agricultural instruction by directing the scholars' attention to some of the simplest and most common natural objects in the neighborhood of the school itself. Gradually this was extended to critical observation of various phenomena in the growth and development of plants and animals. Later, elementary text-books on these and other subjects connected with rural life were introduced and studied.

Among the country schools, however, only the most favorably situated have been able to conduct even elementary work along these lines. There are several reasons for this. The subject is new to the work with children, and the majority of public school teachers are not prepared to give instruction in agriculture because until recently there was no demand for such instruction and consequently no provision had been made either for qualifying the teaching force for imparting it or for equipping the schools with suitable apparatus.

As a part of the course in education for children of public school age, a system of "clubs" has been organized in many sections by local teachers and county superintendents of schools, intended to give the pupils a knowledge of rural life and at the same time be of ser-

vice in preparing them for their future work, whether that work be on a farm or in some other occupation or profession. The club activities are mainly in the form of contests in judging grains and animals, with some field work, such as growing corn, potatoes, or similar crops. The field operations are restricted to quite small areas, and to comparatively few varieties of products.

In order that opportunity to become acquainted with agricultural operations may be given to those who have left the public school and from whose ranks the future farmers and their wives must be supplied, the farmers' institutes in several States have organized and are now conducting what are known as "institutes for young people."

Because of the fundamental difficulty in securing teachers capable of giving vocational instruction in agriculture in the rural schools, and from the fact that after the scholars leave school no provision has been made for giving them opportunity to receive such instruction, the farmers' institute has undertaken the training in agriculture of rural children after leaving school. In doing this it has found it necessary to drop from its system of instruction the purely educational feature and devote itself strictly to giving vocational instruction. Such studies and practice, therefore, as the institute utilizes, have in view the perfecting of the individual in his vocation. The institute system, therefore, partakes more nearly than any other of the trade-school method, and is intended for youth above 14 years of age. It differs from the work carried on by other agencies employed in training country youth in that its primary object is to build up a better agriculture by teaching young people methods for increasing crops, improving animals, restoring worn-out soils, and disposing in a profitable way of the products of farms. It is undertaking to teach youth *how to make money in agriculture*.

The fact that there can be no physical compulsion exerted in bringing those who are to be reached to attend upon any course of teaching makes it necessary to employ other methods for securing their attendance and attention. There are at least two characteristics in the rural youth that can be depended upon to respond to proper appeal—ambition and love of gain. With respect to the first, young people are naturally interested in a subject or exercise when presented in the form of a contest. Their plays for the most part are of this nature. When properly planned and conducted such exercises not only interest young people, but they possess in addition features of great practical and educational value. They stimulate the creative faculties of the contestants, teach the relation between cause and effect, develop power and desire to do things, show how to apply previous knowledge derived from books or school to solving the problems of life, and by keeping the mind occupied with useful purposes they stimulate to further and more determined effort. The contest method, therefore, has wisely been adopted by the institute for awakening interest and creating enthusiasm among young people in agricultural operations.

The subjects that can be successfully studied in institutes for young people cover a wide range and may ultimately include the entire field of rural life. Since the institute is dealing with boys and girls who for the most part are without much experience, and while the subjects studied must be treated in a way to be intelligible to them, yet it by no means follows that because the pupils are not of full age the teaching and the truths taught must be correspondingly elementary.

While the farm presents problems most complex and difficult to be thoroughly understood, on the other hand many of its operations are apparently so simple that they seem to require no particular thought or skill for their performance, and consequently come to be regarded as of minor importance. Many of the manual processes are of this character. They are largely matters of practice, or operations repeated until a degree of dexterity is acquired in their performance. The general lack, however, of both knowledge and skill on the part of many of those who engage in these everyday operations is very marked when their performance by an ordinary worker is compared with the rapidity and perfection of their execution by an accomplished expert. With a view to improvement in this direction the institute for young people should offer prizes for superior skill and proficiency in manual processes, and should hold competitive exhibitions at which dexterity and skill would be recognized and rewarded.

In order to increase interest and at the same time to instruct young people, the gathering of collections provides a valuable means and should be encouraged. Specimens of rocks, soils, grasses, grains, weeds and weed seeds, vegetables, flowers, fruits, insects, etc., furnish material for such collections.

The list of contests also could be extended to the preparation of papers and the holding of oral examinations upon subjects requiring wider culture, knowledge, and experience than those just mentioned. Such a list might embrace farm management, orchard management, landscape gardening, vegetable gardening, flower gardening, practical housekeeping, the preparation of balanced rations, also papers upon local history, on the local fauna and flora, local geology and geography, local laws, local markets, sanitation, etc.

In addition to the subjects discussed in the meetings, the institutes for young people should outline courses for home reading, taking up definite groups of subjects or lines of work, and should assist the readers in obtaining bulletins and other publications from their state experiment stations and the United States Department of Agriculture. The institutes might also include a brief systematic course in the generally neglected but most important subjects of farm bookkeeping, local laws, local history, farm management, etc., and they might discuss the advantages and operations of cooperative associations organized for the purpose of buying and selling and for securing the more economical transportation and distribution of farm products.

In contest work a necessary preliminary is a carefully prepared plan, giving full directions for carrying out the various operations which the contest embraces, the method of judging, and the nature of the awards.

The contest feature of the young people's institute should be graded so as to be as far as possible a complete and progressive course. When completed a certificate should be given stating the work performed by the contestant during the period in which he was a member of the institute.

The course should begin with a simple exercise like the growing of some common crop and end with the more difficult, as a daily record for twelve months of the operations of a farm, with comments on these operations, and a set of books showing the loss or gain of the enterprise for the year.

By the method of pursuing a systematic course for four or five years the practical work of the young people's institute would be preparatory to their undertaking the larger operations of a farm or home, and instead of the contest exercises being disconnected and incomplete, as now, they would be systematized into a course that would cover the principal operations of a farm and be of real service in the future life of the contestant.

It has been found by experience that young people are greatly attracted and influenced by rewards, and that they value these rewards far above their worth in cash. Money for prizes can usually be secured without difficulty by applying to public-spirited citizens in the community for contributions, many of whom are glad of the opportunity to assist worthy young people in any effort that they may make to better their condition and become more useful citizens of the State.

In a few States the farmers' institute and the college of agriculture, by conducting what are called boys' encampments, have interested in agricultural subjects many boys who would not join the ordinary club contest. The camping-out idea appeals to them as a pleasant and enjoyable diversion, and the lectures, demonstrations, and judging contests which form a part of their daily life for the week or two during which the camp is held are pursued with pleasure as well as profit. Their interest is aroused by the scientific features of subjects which they have never before understood and which are here exhibited in their relation to the practical. Many boys who otherwise would never have been reached are thus started in search of further useful information. These boys' encampments are, strictly speaking, young people's institutes. The members live and study together during the entire meeting; prizes are awarded for winners in stock, grain, and similar judging contests, and for proficiency in other agricultural subjects as determined by a final examination of the work pursued at the encampment.

For a while at least institutes for boys and girls should be union meetings, with special sessions for each sex as occasion may re-

quire. The membership should be restricted to persons over 14 years of age and should not as a rule include those over 18 or 19 years.

While attendance upon the institutes is of necessity voluntary, yet it is important to effect, as early as practicable, an organization in each locality composed of a membership that can be depended upon to attend the meetings and to assist in carrying on the work. To accomplish this it will be necessary to secure pledges from as many as possible to a form of constitution that embodies these obligations.

Interest in institutes for young people should not be limited to farmers. The support of business, professional, and public-spirited men generally is necessary to make the movement a success, and this support is more likely to be given if the institutes are planned to include town as well as country boys and girls. Merchants, lawyers, doctors, mechanics, and tradesmen should be invited to assist.

Every young people's institute organization should be provided with a library of reference consisting, along with books of general reading, of bulletins, pamphlets, and other books by recognized authorities upon agriculture and domestic science. This library should be in charge of the county institute and be available for use by all young people belonging to the institute organization of that county.

The farmers' institute can materially assist in inaugurating the movement for the introduction of agriculture into the public schools by giving information to teachers, county superintendents and parents respecting this kind of work, and may go to the extent of organizing and conducting clubs as samples of what the schools should do in this direction. As soon as the institute has organized such a club and has succeeded in interesting a group of children of school age and their teachers in contest work, it should turn it over to the school authorities for further attention and control. Children, therefore, of school age (10 to 14 years) should be committed to the school authorities for agricultural club work during the period of their connection with the school. After leaving school, the farmers' institute for young people can take charge and give them the special vocational training that they need to become proficient in the practical operations of the farm.

Hitherto the farmers' institute has devoted its energies almost exclusively to interesting adults in agriculture and household art. It has selected its subjects for discussion and chosen its instruction with this in view. A new field of activity has suddenly opened up, one that is altogether unoccupied and for which no adequate provision has yet been made—the vocational training in agriculture of country youth between 14 and 18 or 19 years of age.

After 14 the public school does not and, as at present constituted, can not reach the majority of rural youth with agricultural instruction. What the secondary schools may ultimately

accomplish in this direction has not yet been revealed. In the meantime these youths are growing up, many of them with no proper appreciation of country life or of its advantages and opportunities in a business way over those of the towns and cities. The farmers' institute can change all this by modifying its present methods to suit the ages, needs and degrees of advancement of these youth. It should avail itself of the opportunity now presented and occupy this field. By doing so it will not only be following out the purpose of its organization, but will also perform valuable service in the present effort for the development of agricultural education and become an important factor in shaping the future of the world-wide movement for agricultural extension now under way.

BOARD OF AGRICULTURE AND FORESTRY.

Minutes of a special meeting of the Board of Commissioners of Agriculture and Forestry, held in the Land Office, Capitol building, October 5, 1911, at 3:30 p. m.

Present: Mr. C. S. Judd, President and Executive Officer; Messrs. J. M. Dowsett and H. M. von Holt, members.

Report of Advisory Committee.

Mr. Judd stated that the meeting had been called for the purpose of reporting on ways and means of combating the Mediterranean fruit fly; that he had taken up the matter with the Governor and after careful consideration it had been decided that by shifting around the conservation fund the amount of \$8750 could be raised, it being the idea that the \$6500 allotted to the Kohala Reserve for tree planting could be reduced by \$3000, and that \$2500 could be taken from the Inter-Island inspection fund and the balance from the unused balance of the conservation fund.

Mr. Dowsett stated that it was his understanding, and also that of Mr. von Holt, with whom he had discussed the matter, that it would require \$17,500, approximately, to carry on the work until the next session of the Legislature in 1913; that of this amount it was believed California would be willing to contribute one-half if it were shown that Hawaii would contribute the other half, and was in earnest in the proposed campaign; that it seemed to be a matter of as much importance to California as to Hawaii, and that it could only be carried on successfully with the coöperation of California. After outlining a possible routine for conducting the work, Mr. Dowsett stated that Mr. Carnes had suggested that California might be willing to send a man down to act in conjunction with Hawaii's Board, and Mr. Dowsett believed it would be best to take the man under the Board's jurisdiction and do all possible to aid and assist him. It was generally discussed as to whether it would be advisable

to communicate officially with California in regard to the contribution of one-half of the \$17,500 and the probable action to be taken in the campaign, and Mr. Judd stated that Mr. Carnes thought such official communication advisable.

Mr. von Holt stated that it seemed that the matter was at present in too indefinite a state for the Board to take this action, and he believed it best to put the whole matter in the hands of a committee, and therefore made the following motion:

Special Committee to Communicate With California.

Moved by Mr. von Holt that further action be referred to a Committee consisting of Mr. Judd and Mr. Dowsett, in regard to communicating with California officials in reference to the Mediterranean fly situation; that said committee take the matter up with the Advisory Committee and, upon being able to report, that Mr. Judd be authorized to communicate the results of the conference to the proper officials in California. Seconded by Mr. Judd and unanimously carried.

There being no further business, the meeting then adjourned, it being stated that the next meeting would be the regular business meeting on Monday, October 9, at 2 p. m., at the same place.

DIVISION OF ENTOMOLOGY.

Honolulu, October 1, 1911.

Honorable Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I herewith respectfully submit my report of the work of the Division of Entomology for the months of August and September.

During my absence on the Coast, Mr. D. B. Kuhns, the inspector of the division, performed the duties required with great satisfaction, and I am pleased to report that during the month of August 32 vessels were boarded and fruit, vegetables and plants were found on 17 of them.

After careful inspection of the various shipments, the following results were obtained:

<i>Special with principal causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Inspected as free from pests	776	12,283
Quarantined	17	17
Quarantined	3	3
Total inspected	796	12,304

During the month of August, 2,446 bags arrived during the month, and were
... ..

Pests Intercepted.

A large consignment of corn from Japan was found infested with the grain weevil *Calandria linearis* and a *Lepidopterous larva*, and after a long fumigation and reinspection was released, all insects being dead.

Some ferns from California were infested with scale *Hemichionasis aspidistral*, and were fumigated. Sandpears from Japan and oranges from Fiji were likewise infested with scale insects, but fruit being prohibited from those sections, the fruit was destroyed.

Brother M. Newell, inspector at Hilo, reports the arrival of nine vessels, three of which carried vegetable matter. He found 107 lots, consisting of 1230 parcels, all of which was passed as free from pests.

During the month I forwarded a lot of *Staphilinid beetles* from the Coast with instructions to liberate where maggot-infested fruit or vegetables could be found. These beetles are of great value to the vegetable growers of the Coast, feeding on cut-worms and radish, onion and cabbage maggots.

Six packages of Japanese beetle fungus were distributed to applicants.

During the month of September 32 vessels were boarded and fruit, vegetables and plants were found on 21 of them with the following results:

<i>Disposal with principal causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests	1053	21,201
Burned	19	20
Fumigated	7	9
	<hr/>	<hr/>
Total inspected	1079	21,230

Of rice, 22,497 bags arrived and were passed as free from pests.

Pests Intercepted.

One hundred and twenty bags of Japanese beans were found infested with a moth larva *Gelechiid sp.*, and after a thorough fumigation with carbon bisulphid they were released. A box of artichoke flowers was found infested with ants, the common black ant *Formica nigra*, and after fumigation was passed. One box of raspberry plants, badly infested with fungus (orange rust, *Coeoma luminatum*), was burned.

Beneficial Insects.

Returning from the Coast, I brought back another colony of *Staphilinid beetles*, and I am endeavoring to rear further colonies from these.

One colony of black scale parasites, *Scutellista cyanea*, was liberated and two lots of Japanese beetle fungus delivered to applicants.

Brother M. Newell, inspector at Hilo, reports having boarded 9 vessels, 3 of which carried vegetable matter, consisting of 187 lots and 2570 parcels, all of which were passed except one lot of oranges badly infested with the purple scale, *Lepidosaphes beckii*, which was burned.

Arrangements on the Coast.

While in San Francisco, I made it my business to visit all the shippers and commission merchants, who send fruit and vegetables to Honolulu, and I explained fully our requirements regarding all shipments. I also furnished them with blocks of inspectors' lists, which are to be filled out whenever any shipments are made. This last matter needed attention, for, although we have written to those who overlooked sending the lists, we did not get any satisfaction from them. My personal visit seems to have given results, for, since my return, our lists have almost doubled in number. I also took particular pains in looking over the shipments of pineapples and bananas which arrived during my visit, finding there is good room for improvement. Careless packing and poor fruit, either infested with scale or showing decay spots, should receive the attention of the shipper at this end, otherwise the California inspectors will surely stop all future shipments. It seems to me that, if we are to continue pineapple and banana shipments to the Coast, the leading shippers could get together and either advise or supervise the less informed shipper so as to obviate the loss of future delivery.

Respectfully yours,

EDW. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

Report for August.

Honolulu, September 5, 1911.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit, as follows, the routine of the Division of Forestry for the month of August, 1911.

Trip to Hawaii by Superintendent of Forestry.

During the greater part of the month, from August 8 to 26, my own time was occupied with an inspection trip to the Island of Hawaii. Going first to Waimea, I inspected the forest planting on the Kohala Mountain above Waimea village, now being done under contract for the government by the Parker Ranch.

The work is progressing in a very satisfactory manner. Between 15 and 20 acres have been planted, over 20,000 trees, mainly *Eucalyptus robusta*, having been set out, with very few failures. A large number of seedlings of this species are being got ready for planting in the ranch nursery at Puu o pelo. The contract calls for the planting of 50 acres; it is expected that this area will all be covered during the next three months. The planting will then be continued by the ranch on its adjoining fee simple land of Waikoloa.

Next I went over to Puuwaawaa to look over a portion of the land of Puuanahulu, for which an application to lease for grazing has been filed by Mr. Robert Hind and the Parker Ranch. During the administration of Governor Dole, this land was temporarily set apart by the then land commissioner as a forest reserve. It now appears desirable that a portion of the area be leased for grazing. I am now preparing a brief report, with recommendations from a forest standpoint, upon this subject.

Experimental Tree Planting on Mauna Kea.

I then spent several days at Waikii, making an inspection of the plots on the slope of Mauna Kea where experimental planting of exotic trees is being carried on with the aid of federal funds. So far the results on Mauna Kea have mostly been negative. In the 7000-foot plot, however, a good proportion, about half, of the four species planted have been established, while in other of the plots some of the tree seed sown a year ago was found to have sprouted and to be growing. In each of the four plots I planted a box of *Eucalyptus robusta*, 54 trees, and sowed some additional lots of seed.

In connection with the Parker Ranch corn farm at Waikii, which now covers 1400 acres, there are to be planted extensive windbreaks and shelter belts of eucalyptus trees. There are now in the nursery at Waikii, ready for planting during the coming winter months, over 35,000 trees. Now that this nursery has been so well established it will be possible to start here, as well, trees for use in the experimental plots. In this way I am confident that in the future much faster progress can be made than has been possible up to this time.

Before leaving the Parker Ranch I spent one day inspecting the tree planting now being done along the Paauhau gulch on the government land of Nienie and in looking over the work of the weed destroying gang, who are using arsenical spray on thimbleberry and German ivy. This treatment is proving a very effective means of combating these pests, besides being very much less expensive than methods previously used. The tree planting along the Paauhau gulch is going forward in a highly satisfactory way. Over 25,000 trees have been set out, the work is well systematized, and the nursery full of young trees.

Kukaiau Ranch Planting.

Under the terms of its lease of government lands, the Kukaiau Ranch is doing extensive tree planting in establishing groves of eucalyptus, mainly blue gum, between the elevations of 3000 and 4500 feet. In order to be in touch with the progress of this work I spent a couple of days with Mr. Robert Horner, going over the areas planted. The planting is progressing at a satisfactory rate, so that the total number of trees required to be set out should be in the ground some time prior to the time limit fixed in the leases.

The greater part of the trees planted during the last three years are making excellent growth and in the few places where there were setbacks while the seedlings were small—in some cases requiring replanting—the little trees have now taken hold and are doing well. Taken altogether the government has good reason to be pleased with the progress of this piece of work.

Examination of Muliwai.

The last part of my stay on Hawaii was devoted to a trip into Muliwai, the government land on the bluff between Waipio and Waimanu valleys, as a part of which I went down into and up the latter valley to its head.

Muliwai and Waimanu are inaccessible localities. Because of the steepness of the trails leading into them, which in wet weather are almost impassable, to visit these places requires special preparations. The present trip was made possible through the courtesy of Mr. August Ahrens, manager of the Kukuihaele plantation, who, at the request of Mr. J. W. Waldron, one of the directors of the company, had had a trail cut up the ridge of Muliwai, through the woods from the government trail. Mr. Ahrens provided a pack train; we camped out two nights in the woods.

In former years Muliwai was subject to cattle grazing, which resulted in the opening up of the forest, the letting in of Hilo grass and the death of the larger trees.

Three years ago the government ordered the removal of all the cattle from Muliwai. This was done, and since then the area has been policed by the Pacific Sugar Mill, so that there has been no further damage. Looking across at Muliwai from Kukuihaele there appears to be a large area of dead forest, but when one follows up the ridge, although there are considerable areas where the large trees are dead, there is found to be much young growth. In my judgment most of the damage to the forest on Muliwai is the result of grazing in past years. With conditions as they now exist, I see no reason to be apprehensive about the ultimate return of the forest on the upper parts of the slope. Shortly I expect to submit to the Board a brief report on this section, discussing certain points about it more in detail.

Proposed Planting at Honokaa.

Just prior to returning to Honolulu I visited the Honokaa plantation and arranged with the manager, Mr. A. Morrison, to supply him with seedlings for extensive shelter-belt planting along the sea bluff makai of the cane fields. Thirty thousand seedlings will be set out during the next few months.

During the remainder of the month I was in my office in Honolulu.

Tree Distribution.

The furnishing of trees from the Government Nursery and the substations at Hilo and at Homestead, Kauai, goes on steadily. I submit herewith Mr. Haughs' report for August, which gives the details of this work at Honolulu. Brother Matthias Newell reports from Hilo that the total distribution from January to June, 1911, inclusive, amounted to 3235 trees.

Botanical Survey.

During a good part of July, Mr. Rock was in the field on Hawaii, collecting in the proposed National Park near the Volcano. He returned to Honolulu early in August, and was at work in the herbarium the greater part of that month.

Owing to limited amounts available for carrying on the work of the Board, it has been considered advisable to transfer the botanical investigations, that for the past three years have formed a part of the activities of the Board, to the College of Hawaii. On September 1, Mr. Rock becomes a member of the college staff, while the herbarium is loaned to the college for an indefinite period. Until the new home of the college is ready, Mr. Rock will continue to occupy his present quarters at the Government Nursery.

Forest Fire Notes.

I am informed by the district fire warden at Wahiawa that the Korean arrested for setting a grass fire near the Wahiawa dam on August 2, 1911, pleaded guilty when arraigned before the district magistrate at Waialua, receiving a suspended sentence for thirteen months. "This," says the district fire warden, "I regard as a victory for the law, that will meet the requirements quite as well as the imposition of a fine, which the man could probably not afford to pay."

In this connection I would report that while I was at Kukuihaele a Japanese laborer employed on the plantation shot three Hawaiian geese, nene, on which by Act 68 of the Session Laws of 1909, there is a four-year tabu. I made complaint to the

deputy sheriff, with the result that the man was arrested and fined \$10. It is the belief of the plantation authorities that this example will have considerable weight locally in causing this law to be respected in the future.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF THE FOREST NURSERYMAN.

Honolulu, August 31, 1911.

Advice and Assistance.

At the request of the officers of the 5th Cavalry, Schofield Barracks, the writer visited the barracks on August 10 for the purpose of giving advice in the planting and care of trees, etc. A few days previous to my visit 1150 trees, consisting of about a dozen different species, were sent to the barracks. It is the desire of the officers to plant large numbers of trees around the quarters and parade grounds and fast growing trees are in demand. Different species of the eucalyptus are recommended owing to their fast growth and their adaptability to withstand the prevailing winds. Other trees and plants more ornamental might be recommended later for certain sheltered places but what is wanted at present is fast growing hardy trees.

Distribution of Plants.

	In seed boxes	In boxes transplanted	Pot grown	Total
Gratis	5,000	825	3101	8,926
Sold	10,000	254	730	10,984
	<hr/> 15,000	<hr/> 1079	<hr/> 3831	<hr/> 19,910

Concession for August amounted to \$72.75, \$43.00 of which was on account of cordwood from Tantalus forest and \$29.75 on account of plants sold.

Experimental Garden, Makiki.

The two men employed at the garden have been transplanting seedlings and doing other routine work.

Experimental Farming in Nuuanu Valley.

One man has been employed during the month, his work being to plant and care for the experimental crops. One day each week and the available men

from Makiki and Nursery, including the two seed men and two prisoners, have been taken to Nuuanu to assist in the planting. Altogether 17 plots containing as many different species have been partly planted. Eight are completed and the balance will be finished just as soon as trees can be got ready. The trees are being propagated at Makiki.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

REPORT FOR SEPTEMBER.

Honolulu, October 5, 1911.

Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I have the honor to submit, as follows, the regular report of the Division of Forestry for the month of September, 1911:

During the first half of this month my own time, with the exception of two days in the field, was given to work in the office, especially the preparation of letters and reports in connection with my trip to Hawaii in August.

Visit to Waianae.

On September 6 and 7, I visited Waianae, to inspect the forest planting being carried on by the Waianae Plantation Company within the boundaries of the Waianae forest reserve, and to look into other forest matters in that locality. Since 1906, the Waianae Company has, under the general direction of this division, but at its own expense, planted in that forest reserve about 30,000 trees. This little forest is growing excellently and in a short time now will make a marked difference in the appearance of the valley. Being the first case of a private corporation voluntarily to engage in forest planting in a government forest reserve, the work of the Waianae Company deserves special commendation. The trees planted are eucalyptus, silk oak and Monterey cypress. In this connection, too, note is to be made of the rapid spread of the algaroba in the upper part of Waianae valley during the last five years, since the creation of the forest reserve.

Trip to Maui.

From September 15 to September 30 I was away from Honolulu on a trip to the islands of Maui and Kahoolawe. I went first to Huelo and spent several days in working out on the ground the details of a forest planting plan which is to be put into effect

by the Maui Agricultural Company and the Hawaiian Commercial & Sugar Company on land belonging to the government in the Koolau forest reserve, bordering the irrigation ditches maintained by those corporations.

I next made an inspection of certain of the forest planting of the Maui Agricultural Company at Kailiili and Opana, Maui, and then met Governor Frear and his party at Lahaina and accompanied them on a three days' trip to the island of Kahoolawe. The object of this trip was to look into the question of the most feasible method of starting reclamation of the denuded portions of that island.

Mr. W. F. Martin, federal hydrographer, who was one of the party, set up four rain gauges on Kahoolawe which will yield data that later will be of value in connection with whatever planting is carried on.

Returning to Maui, I visited the Cornwell Ranch in Kula to secure information on the ground on which to base recommendations for a planting plan for a portion of the government lands of Waiohuli-Keokea and Waiakoa-Alae, there being requirements in the new leases of those lands that become operative on November 1, 1911, that the ranch shall plant groves of trees.

The last few days of my stay on Maui were given to an inspection of certain of the plots on the upper slopes of Mt. Haleakala where experimental forest planting is in progress under federal auspices. In Plot I, near Puu Nianiau, elevation 6000 feet, there was a very encouraging showing, both of the seedlings set out and of seed sown in seed spots. In Plot II, further toward Kula, elevation 7000 feet, the showing was not so good, many of the seedlings planted out last spring having died. This is probably accounted for in part by the fact that on the mountain the past summer has been unusually hot and dry. Additional lots of forest tree seed were sown in both plots. I returned to Honolulu on the morning of October 1.

Botanical Bulletin.

September 2 there was issued, as Botanical Bulletin No. 1, an illustrated 16-page pamphlet entitled "New and Noteworthy Hawaiian Plants," in which Mr. J. F. Rock of this Division described a new genus, *Hibiscadelphus*, consisting of three new species, and a new *Sapindus*, and Dr. L. Radlkoff of Munich, Germany, a new species of *Conium*. A portion of the cost of publishing this bulletin was defrayed by a private subscription. An edition of 750 copies was printed and distributed to the various botanical exchanges.

During the year part of the usual annual distribution of the Hawaiian Catalogue, the Yearbook of the U. S. Depart-

ment of Agriculture has taken place. The books are forwarded to this office by the Delegate to Congress, Hon. J. K. Kalaniana'ole, and sent out by us to a carefully selected list of names. The 1910 Yearbook is a particularly interesting volume. A few copies still remain, which may be had, while they last, upon application.

The Nursery.

Mr. Haughs' report for September shows that increasing interest is being taken in tree planting by sugar plantation companies, a number of large orders for seedlings having recently been placed.

Very unfortunately, through inexcusable carelessness on the part of the road gang at work on the new Tantalus road, severe damage was done at the experimental garden in Makiki valley early in September by rocks thrown into the nursery during blasting. Providentially none of the laborers were hit, but both buildings and plants suffered. The houses have been repaired by the Superintendent of Public Works, but it will be impossible to make good the damage to the plants, many of those destroyed being rare specimens raised from seed sent from abroad by Mr. G. P. Wilder.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF THE FOREST NURSEYMAN.

Honolulu, Sept. 30, 1911.

Mr. R. S. Hosmer, Superintendent of Forestry.

DEAR SIR:—The following report gives the principal work done during the month of September:

Distribution of Plants.

	In seed boxes	In boxes transplanted	Pot grown	Total
Gratis	26,850	750	602	1,352
Sold	26,850	4700	487	32,037
	<hr/> 26,850	<hr/> 5450	<hr/> 1089	<hr/> 33,389

Collections on account of plants sold amounted to \$15.85.

For the next three or four months, our principal work will be the raising and sending out of trees. We have at present on file orders for 210,000 forest trees to be delivered within the next few months. This amount added to our regular distribution, which consists of smaller orders from homesteaders and others

who are not required to notify us in advance, will keep us busy. The majority of the trees ordered is for seedlings in seed boxes. A few thousands, however, are wanted transplanted and ready to set out.

Experiment Garden, Makiki.

The quarters and a large quantity of the nursery stock suffered severely through the discharge of a heavy blast of powder which scattered rocks all over the quarters and plants. The blast was the work of the men laboring on the new Tantalus road which passes immediately above the quarters.

Large rocks, some of which must have weighed over a ton, were sent flying all around the quarters. The cottage, which is generally occupied by a man and family, but at this time luckily happened to be empty, was left after the blast in a very shattered condition. The end facing the new road was practically battered in, the floor and roof smashed in many places. The stable also suffered, the front part being practically wrecked. The storeroom and potting shed had several pieces of roofing and rafters destroyed. The nursery stock that suffered most was the new plants introduced by Mr. Gerrit P. Wilder, about 1000 of which were totally destroyed. The loss of so many rare plants is much regretted. The Superintendent of Public Works has had the government carpenters repair the wrecked buildings.

U. S. Experimental Planting in Nuuanu Valley.

One man has been employed during the month, his principal work being hoeing and planting.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

RABBIT PEST HERE.

Honolulu, Sept. 15, 1911.

Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—There has recently come to my attention from wholly reliable sources the fact that in two localities on this island rabbits have escaped from their owners and are now at large in increasing numbers. The localities where they have been seen are on the land of Kalauao, Ewa district, near Honolulu plantation, and at Mokuleia in the Waialua district.

Those at Mokuleia are supposed to have got away from Chinese banana growers. They have been seen at large there during the last three or four months. The band is a small one, perhaps not more than a dozen, but there are said to be two generations. Two rabbits have recently been caught.

The band at Kalauao appears to be larger and has probably been at liberty longer. It is said not to be uncommon to see rabbits at the point where the government road makes a sharp turn, where there is an artesian well in the angle. It seems likely that these rabbits may have got away from Orientals living in that vicinity.

In view of the very serious damage to agricultural crops and other vegetation which rabbits can do when in large numbers the questions of getting rid of these two bands seems to me one that should receive the attention of the Board. I understand that some years ago this Territory suffered severe loss from depredations of rabbits, at which time was enacted the special legislation in regard to these animals now on the statute books (Game Law: Rabbits: Chap. 37, Revised Laws; Sections 465-468). In this connection, too, members of this Board do not need to be reminded of the extensive damage which rabbits have caused in California and in the Australian states.

I am not sure how far the Board of Agriculture has power or authority to act in this matter, but it is evident that the time to check a pest like rabbits is when the bands are still few in number. The expenditure of a comparatively small sum now, in the employment of men to exterminate all the rabbits at large, would be money well spent. If the Board may not itself take up this matter I recommend that steps be taken to bring it forcibly to the attention of those who are in a position to act.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

HAWAII IRRIGATION COMMITTEE.

(Forester Special Correspondence.)

CHICAGO, Illinois, August 31.—Governor Frear writes in a recent letter to the headquarters of the National Irrigation Congress that he has appointed an advisory committee with which the officers of the Irrigation Congress can coöperate in making its coming meeting here, December 5 to 9, of the greatest benefit to Hawaii.

Members of the advisory committee appointed by the Governor are Ralph S. Hosmer, William O. Smith, Alonzo Gartley, Walter F. Dillingham, and Jared G. Smith.

"Save the forests, store the floods, reclaim the deserts, make homes on the land," is the motto of the National Irrigation Congress, and clearly sets forth its objects. Of particular interest is the consideration the congress will give at this session to reclamation by drainage. This year its sessions are held simul-

taneously with the United States Land and Irrigation Exposition and the International Live Stock Show. These three big events offer unusual opportunities for communities to make known their advantages to hundreds of thousands of prospective farmers and settlers, and that interested States might make the most of these opportunities the suggestion was made that their governors appoint advisory committees.

CONCRETE MATERIALS FOR FARM IMPROVEMENT.

(Forester Correspondence.)

WASHINGTON, D. C., October 2.—The early settlers, colonists and pioneers encountered a trackless forest extending from the Atlantic to the prairies, the removal of which was necessary before they could create farming land. As the country began to be settled demand upon the forests was made for building material. A hundred years ago almost all agricultural structures, and buildings of all kinds in farming communities, were constructed from lumber procured from nearby forests. Even a few years ago the farmer used nothing but lumber for farm buildings. The timber was cut from his own land and sawed at nearby mills, so that his own trees were converted into his troughs, dairy houses, walks, fences, and even his house and barn; hence the high price of lumber, consequent upon the rapid decrease in the country's timber supply, was felt last by the farmer—though now the demand for a new building material is nowhere more keenly felt than on the farm.

Such a material has been found in concrete, which in some instances has proved superior to lumber, brick, or building stone, and is being used for all kinds of farm structures from silos to sidewalks, and stables to dwellings. This material, too, like his lumber, can generally be largely produced from his own or nearby land, as nothing but the cement and metal bars for reinforcement need be purchased from afar, and much of the work can be done by the farmer and with ordinary farm labor under the direction of a skilled concrete worker.

Frequently concrete users have made costly mistakes by not informing themselves properly, before starting their work, concerning the correct methods of making good concrete. As a guide in the selection of the proper materials, especially the sand and gravel which form six-sevenths of the solids used in the concrete, the United States Department of Agriculture issued Farmers' Bulletin No. 461, containing suggestions which should be observed.

Concrete is manufactured stone formed by mixing cement, sand, and stone or gravel (i. e., pebbles) together with water. The cement is but a small part of the mixture, and is the product of skilled workmen under the supervision of the manufacturer

who must compete with all other makers of like material; but the sand and gravel constituting one-third or one-half of the final product must be selected and prepared by the farmer, and this is where most failures originate. Various amounts of each are used, according to the use to which the finished product is to be put. The mixture in which all the spaces or voids between the stones or gravel are filled with sand and all the spaces between the grains of sand are filled with cement is the ideal mixture. The ideal is seldom attained, but the bulletin gives detailed instructions and instructive illustrations, which should go far toward enabling the farmer to closely approach it.



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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugh, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications **SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.**

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. VIII.

NOVEMBER, 1911.

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In this number space is given for a comprehensive report, in the U. S. consular series, upon the Canadian cooperative fruit associations; also a brief report on a fruit exchange formed in Cuba. There is no doubt material in these reports which might be drawn upon by those who are moving for marketing advantages for small farmers and homesteaders in the Territory of Hawaii. Long ago the Forester brought to the attention of its readers the great benefits of cooperation to fruit raisers in California and Jamaica.

In this number is reprinted the text of a little pamphlet on the correspondence courses in agriculture of the College of Hawaii. It is revised, as herein appearing, in a number of verbal particulars, by Professor MacCaughey. The brochure can hardly fail to influence boys of the Territory about concluding their ordinary school career, having their own choice—as well as attracting the attention of elder citizens taking a concern in having the youth look that way for a livelihood—toward making further pursuit of knowledge in the line of practical tillage of the soil, the basis of Hawaii's prosperity.

President Taft's advice to the agricultural public, conveyed in his address before the National Conservation Congress, with reference especially to the necessity of deep tillage, rotation of crops and efficient drainage, contains nothing new in principle. These three cardinal essentials of successful farming many of us who spent our earlier years upon the soil will remember to have seen expounded in books in the little libraries of our fathers. Yet the advice is none the less timely and necessary even in these days of abounding and advanced science of all industries. Generations of farmers have arisen upon soil in our country's vast domain which was virgin to their fathers, and by the latter mistakenly imagined as being of practically exhaustless richness and fertility. Those who have not found out the mistake by experience, for which in some regions there has not yet been time enough elapsed since the soil was first turned over by the plowshare, must now be helped to the knowledge by instruction. Their case is precisely similar to that of our forefathers, who likewise thought the qualities of the land on which they were pioneers were everlasting.

In these islands it is only at great cost of artificial fertilization that the soil can sustain the enormous strain of the single crop industry to which the greater part of its area is subjected. Sugar plantations also where deep tillage was adopted owe much of their fame as heavy producers to that method, and in some instances seasonable fallowing of the land in lieu of rotation of crops, the latter impracticable because of the extensive scale of sugar raising here, has been necessary to salvation of the soil.

Dr. Norgaard's account of the international convention of veterinarians in Toronto, embodied in his report in this number, will be read with great interest by stockmen and dairymen. His keen disappointment at the omission of a report upon bovine tuberculosis in the proceedings will be appreciated by readers of our review, in a former number, of the famous report of last year to which he refers and which had aroused his expectations of something equally good, if not better, at this year's session. It is gratifying, however, to hear that our veterinarian was able to avail himself most profitably of opportunities to refresh his store of science in Washington in the course of his journey, as also very pleasing to be told that the advancement made in the control, prevention and suppression of animal diseases in these islands was—both at the convention and at the Department of Agriculture in Washington—quite well recognized.

Every now and then there appears in the newspaper press opinions, of professedly sophisticated authorship, to the effect that small farming or diversified agriculture in Hawaii can never prosper or make anybody prosperous. Both the trade returns and the freight manifests and waybills of our steamers and railroads, together with the perpetually high scale of prices for food products that are capable of abundant production in Hawaii, furnish all the argument needed utterly to confute such pessimistic and destructive opinion. There are only needed, to make diversified agriculture on the part of small landholders one of the greatest elements of Hawaii's prosperity, intelligent methods of cultivation, adequate transportation at reasonable cost and well devised marketing arrangements.

An article on the air plant, by Professor MacCaughey of the College of Hawaii, is in type and will appear in the December number.

CANADIAN COOPERATIVE FRUIT ASSOCIATIONS.

(From Consul Felix S. S. Johnson, Kingston.)

There are thirty-six so-called cooperative fruit associations in Ontario. These may be divided, roughly, into three classes: apple associations, shipping mainly to distant markets; general fruit associations, concerned with shipping apples, pears, plums, peaches, cherries, berries, etc., to home and distant markets; and small-fruit associations, engaged mainly in shipping berries to home markets.

Nearly all the small-fruit and some of the general fruit societies are rather loosely organized, but truly cooperating. The others have all organized with cooperative intent, but in some instances have fallen short of their ideal through lack of knowledge.

APPLE-SHIPPING SOCIETIES.

The Forest Fruit Growers' Association is one of the best examples of a simple form of organization. It is truly cooperative. There is no share capital, and the deposits of buyers are depended upon for working capital. It rents a shed and packs most of the apples in this shed. Sales are made f. o. b., and each buyer is required to pay into the bank a certain percentage of the price before the fruit is shipped and the remainder within a certain number of days. The society then pays to each member a certain price per barrel, reserving a little more than sufficient to pay expenses. At the annual meeting all remaining moneys are paid back to the growers according to the business done with the society. The only person who is paid—besides necessary employees—is the secretary-manager, who receives a commission of five cents per barrel on the total pack. The average annual pack is about 7000 barrels. There are about forty-five members, and the society is steadily growing.

The Oshawa Fruit Growers' Association is described by the manager as being a "double-barreled" affair. A joint stock company, composed of the members of the society, owns a central packing house and charges so much per barrel for handling through the packing house. All fruit is packed at this house. Revenue from charges for the use of the packing house is used to provide a fund out of which expenses are paid, and also a fixed dividend of 6 per cent. on the stock. The society proper is cooperative and does not differ essentially in its workings from the Forest Association, except that sales are made largely by consignment. The value of the plant is about \$5,000, the capacity of the frost-proof storage is about 8,000 barrels, the mem-

bership is seventy-five, and the average pack about 8,000 barrels of apples.

The Norfolk Fruit Growers' Association, with head office at Simcoe, Ontario, resembles in form the Oshawa Society, but the stock company owning the warehouse consists of only a few members of the association. How long this arrangement will remain satisfactory is a question. At present it is one of the most successful of the associations; it has a membership of 188, and an annual output of about 18,000 barrels of apples.

There are a number of smaller societies, as well as large ones, organized either on the Forest Fruit Growers' Association plan or as stock companies, having an annual output of from 1,000 barrels upward. In some cases these societies have been handicapped by a lack of knowledge of the business.

GENERAL FRUIT ASSOCIATIONS.

The Burlington Fruit Growers' Association is the oldest society in Ontario. It is remarkable for the simplicity of its organization, as it has no constitution or by-laws, no warehouse, and no capital in any form. There is only a verbal agreement among the members. Each grower packs his own fruit, and it is shipped under his own name and on its individual merits. There is a manager who orders cars for shipments, directs growers when to deliver fruit, pays over to each grower the price that his shipment has brought, and attends to other details. For this he is paid a small commission. The officers of the society are a president and a board of directors. The continued activity of the association is good evidence of its usefulness.

The St. Catharines Cold Storage Co. is a good example of a concern organized as a joint stock company, yet working steadily in the direction of true cooperation. This society was organized in 1896, and has a mechanical cold-storage plant valued at \$13,000 and a working capital of \$2,000. A part of the capital was secured by mortgage on the property. The debt has been entirely paid off by the addition of new members who took stock, and by applying the dividends on the stock to this purpose. Working capital has also been provided. The society is now endeavoring to effect an equal division of shares, with each member holding \$50 worth of stock. To do this it is transferring stock of the old members holding more than this amount to new members and to old members not holding so much. Thus the society will be conducted eventually on a one-man-one-vote basis. The company ships to all parts of Ontario and Quebec and to many parts of western Canada, the shipments consisting of apples, pears, peaches, plums, berries, grapes, and an increasing quantity of other fruits and vegetables. The sales amount to about \$75,000 annually. The society handles supplies for its members and

others. It handles fruit for non-members, and sells supplies to them, paying over one-half as much profit per dollar as it returns to members. The supply branch is a very important part of the business of the society, as it handles all kinds of fruit packages, spray pumps, and other machinery, ladders, etc., seeds, fertilizers, and spraying chemicals. It has now become the temporary wholesaler for the federation of fruit associations. In 1908 the supplies amounted to about \$27,000, and in 1909 to \$40,000. The society charges a little less than regular market prices and then rebates to members and to non-members buying through the association and selling their fruit the same way, the percentage of rebate depending upon the amount of business done with the society.

The Grimsby Cooperative Association is a society of seven members who own nearly 500 acres of land, largely planted with fruit. The stock is evenly divided among the members. The management of such a society is very simple compared with that of the St. Catharines Co.

SMALL FRUIT ASSOCIATIONS.

The Donnvile Fruit Growers' Association is perhaps one of the best examples of the small-fruit associations. There are about thirty-five members. Fruit is shipped to local markets, and each member grades his own and ships it under his name. The society is incorporated without share capital. Its chief activity is in buying fruit packages, aiding in securing good markets for fruit, and disseminating useful knowledge by arranging meetings, etc. Societies of this kind are nearly all local branches of the Ontario Fruit Growers' Association, which is not a trading society, but an organization having for its object the advancement of fruit-growing interests generally. A number of these local units are slowly growing into cooperative societies for buying and selling purposes.

MANAGEMENT AND EXPENSES OF FRUIT ASSOCIATIONS.

All the associations have practically the same arrangements for government of the societies, viz., a president, a vice president, a secretary, who is usually manager, a treasurer, and a board of directors varying in membership according to the size of the society, and the territory covered. Expenses are met by a straight charge per package. Although directors usually work gratis, some societies allow \$1 to \$1.50 and mileage for each meeting held. The president usually works without pay, but in some cases is allowed \$20 to \$70 per year. One association, with an output of 1,200 to 1,500 barrels per year, pays its manager \$2 per day for superintending the packing and the loading of

cars. Four associations with packs running from 2,000 to 8,000 barrels per year pay 10 cents per barrel to the manager. In the case of the larger associations this was not enough to hold a good man, and the rate this year has been raised to 15 cents per barrel, with the manager paying the bookkeeping expenses out of his own earnings. Two other associations, with packs of 3,000 and 7,000 barrels, respectively, pay at the rate of 5 cents per barrel. In the case of the larger of these two, this is only for the shipping and selling, and does not include looking after the packing. One of the associations, with an output of from 20,000 to 40,000 barrels per year, pays 20 cents per barrel to its manager, but he is required to pay from that all of the expenses of the inspection, bookkeeping, etc., which would amount to at least \$2,500 or \$3,000 a year. Two associations with large outputs pay a straight salary of \$1,000 and \$1,500 per annum, allowing also a small percentage on all supplies sold to the members. Two of the smaller associations, with outputs up to 2,000 barrels, report that they have no paid manager, the work evidently being undertaken by the executive committee. Of the newer associations, the majority are paying 20 cents per barrel, the manager to defray out of this amount all bookkeeping and other office expenses. One association just starting has agreed to pay its manager \$1,500 straight salary.

FEDERATION OF FRUIT ASSOCIATIONS.

As the individual societies in Ontario began to get in touch with one another, the need of closer relations was felt by the co-operative leaders. The fruit branches of the Department of Agriculture at Toronto and Ottawa, in their endeavors to encourage the fruit industry in the Province, soon found that these societies offered one of the best mediums for reaching the individual grower. One of their great difficulties in the way of advocating better quality had always been the fact that improved quality in many cases did not bring proportionately greater returns to the grower, because most buyers paid only a flat price regardless of quality. The co-operative societies, however, paid to each member the full amount due him, according to the quality of the fruit.

In 1906 active steps were taken to unite the scattered societies into a loose form of federation, and thirteen societies became affiliated under the name of the Cooperative Fruit Growers of Ontario, with head office at Toronto. An annual fee of \$5 for each association was fixed.

In the beginning the objects of the federation were to discuss forms of organization and means of securing a higher grade of fruit, to keep the associations in touch with the prices being offered by buyers and prices received in the home and export mar-

kets, and to secure a more uniform distribution of the crops. The secretary gathers from various inspectors and correspondents a report of conditions in the various fruit-producing sections of the Province and Canada, and during the selling season the condition of the markets, the quality of the fruit being shipped, prices offered and received, and other items of interest are sent to each society in a weekly report. Before the apple associations make sales in the fall, a meeting of the federation is held, at which a range of prices is suggested as a basis of sales. This is adhered to as nearly as market conditions will permit.

As improved methods of production became general among the members of the associations, large quantities of spray materials, machinery, etc., came into use. These were always high in price because they were sold only in retail quantities by a few local dealers. In 1908 the federation determined to arrange for the purchase of supplies for all societies. The saving in this way is immense, as carload lots of chemicals can be bought at a time of year when prices are at their lowest and held until wanted for use. Each society is asked to send to the head office an estimate of the amount of supplies required, which serves as a guide in buying. Other supplies, such as packages and spray machinery, are bought in the same way and a great saving has been effected. Buying cooperatively has made it almost impossible for a combine of manufacturers to control prices, as was attempted with fruit packages a few years ago. The makers of baskets from whom the St. Catharines society had been buying put the prices of baskets so high that the society determined to place their order in the United States. Their order was very large, and the prices so favorable in the United States that they have since been able to make very favorable terms with Canadian concerns.

The chief difficulty the federation has to deal with in the supply business is lack of capital and the need of a central warehouse. To overcome this the St. Catharines society is acting as distributing agent for the federation. This association orders the supplies, holds them till wanted by the other societies, and then forwards them, charging a small commission for the service. The federation will shortly be incorporated and a warehouse will be built and a manager employed when finances permit.

GRADING AND PACKING THE FRUIT.

Packing and grading are done by the grower, or by the grower with a system of inspection by the society, or by the society. The first system is very loose and the only satisfactory method of sale in this case is to sell each grower's fruit on its individual merits. The objection to the second method is the lack of uniformity in the pack. The third system is the one usually followed

by apple and citrus fruit societies. Two methods of packing by the society are followed. In one case the fruit is brought to a packing house to be packed and graded by packers employed by the society. This method allows of a very uniform pack, as the manager can keep a direct watch on the operations throughout. It also allows of the fruit being kept under good conditions until time of shipment.

The other method is to have the fruit packed and graded in the orchard by packers employed by the society. In some instances the society picks, grades, and packs, while in other cases only the two latter operations are performed by the society. One society employs a number of packing gangs and has inspectors who travel from gang to gang to insure uniformity in the pack. This system of packing relieves the grower of the work of handling the fruit at a season of the year when he is very busy. It is significant that some of the societies employing the packing-house system are beginning to pack a part of the fruit in the orchard.

DETERMINING THE PRICES TO BE PAID THE GROWERS.

In Ontario there are three methods of determining what prices the growers are entitled to, viz.: Pooling all returns, pooling returns for certain varieties and fruits, and prorating prices for each variety and grade. The first method was in the past the common one employed by societies in Ontario, but is open to the objection that it does not discriminate between poor and good varieties and is thus inclined to encourage the production of poor varieties. The second method is becoming popular. The varieties of fruit of a certain kind are divided into classes, those varieties of nearly equal quality being placed in the same class. The price is then pooled on each grade of each class. This does not favor the production of poor varieties, but rather encourages the grower of poor varieties to grow a more valuable article. The third method is the one that gives absolute justice to the grower, but it entails an elaborate system of bookkeeping. In this method each grade and each variety is kept separate account of and the price is pooled on each variety and grade. Pooling is necessary, as one shipment may not sell so well as another, the price being neither that of the grower nor the society. By following this method each member gets the exact returns that each would have received on the markets. Some of the general and local fruit societies pool each day's shipments, while others pool

DIVISION OF ANIMAL INDUSTRY.

Honolulu, October 9, 1911.

Hon. C. S. Judd, President and Executive Officer, Board of Agriculture and Forestry.

SIR:—I have the honor to submit herewith my report on the work of the Division of Animal Industry since the meeting of the Board on August 7, 1911, with special reference to my attending the annual meeting of the American Veterinary Medical Association, at Toronto, Canada, Aug. 22nd to 26th, as authorized and provided for by the Board at the said previous meeting. Appended herewith you will also find the report of the assistant territorial veterinarian pertaining to the routine and other work of the Division as performed by him during my absence.

Visit to San Francisco.

Pursuant to instructions and authorization as specified in the minutes of the meeting of this Board on August 7, 1911, I proceeded on that day from Honolulu to San Francisco per S. S. Mongolia, arriving at the latter place on August 13th. This early departure became necessary as there was no other steamer leaving Honolulu which would have enabled me to reach the place of meeting at the specified date, whether via San Francisco or Vancouver. There being, however, many subjects to be discussed with the Bureau of Animal Industry inspector for the port of San Francisco, the spare days in that city were by no means wasted, and the most important subject—the exportation of live stock from the States to this Territory—was thoroughly gone into. As a result it is my most pleasant duty to report and acknowledge the unfailing courtesy and the absolute sacrifice of time and convenience constantly extended and cheerfully conceded by Dr. Geo. S. Baker, inspector in charge, Bureau of Animal Industry, U. S. Department of Agriculture, not alone during my stay in San Francisco, both going and coming, but likewise through the more than five years, during which time we have been in constant communication as the guardians of the health of all livestock coming from the mainland of the United States to the Territory of Hawaii, at our respective ends of the line of shipment. I cannot emphasize strongly enough that it is due principally to Dr. Baker's untiring efforts and absolute disregard of office hours and convenience, and not his own alone, but that of his entire force, which has changed the Hawaiian Islands, as far as livestock shipments are concerned, from being the dumping grounds for glandered horses, tuberculous cattle, cholera hogs and scabby sheep, to being the only absolutely protected part or district of the United States,

where it is now next to impossible to "unload" any kind of livestock, without it being reasonably certain that they are not bringing with them any infection or "germs" of any kind which might prove deleterious to the livestock interests of the Territory. That this end has not been gained without a rich harvest of opprobrium, enmity or ill-will goes without saying, but that the same has at times assumed such proportions as to cause Dr. Baker to seriously consider a request for relief from the duties of inspecting livestock for the Islands is undoubtedly news to the members of the Board, though perhaps not to some of the local importers. Dr. Baker joined the force of the Federal Bureau of Animal Industry in 1891 when he was assigned as my assistant on the killing floor of Nelson, Morris & Co., in Chicago, and I am very much inclined to believe that had it not been for our old time friendship, and personal regard of long standing, the inspection of livestock for the Islands could very easily have been limited to the letter of the law and to the strict observance of and compliance with rules and regulations, which, especially when dealing with such delicate matters as the interpretation of a tuberculin or mallein test, would speedily have resolved itself into the dissolution of the present system of inspection and left us to protect ourselves as best we might. But bitter experience has proved that the above mentioned tests are as good as worthless when applied by paid practitioners whose bread and butter too often depend upon their interpretation of the test records. And nobody knew this better than Dr. Baker and for this reason he held out. He was not going to see us loaded up with any more diseased stock than had already been shipped here, but that his vigilance on our behalf should result in his being practically ostracized locally among the profession was somewhat of a surprise to us. However, California is rotten to the core with livestock diseases, and were it not for the strong hand of the Federal Government in compelling that effective measures be adopted the State would undoubtedly be absolutely quarantined against by all adjoining and neighboring States. Hence, we need Dr. Baker's continued assistance, and I would respectfully suggest that this Board express to him its appreciation of what he has done for the protection of the livestock interests of the Territory and ask that he continue his vigilance on our behalf in spite of what unpleasant results may accrue. So many representations were made to Washington that the chief of the Bureau came to California in person to look into the matter and, while fully sustained by the chief in all of his actions and decisions, it should be remembered that it is the enforcement of the regulations made by this Board which has at times made life less pleasant for him and which for years has given him much extra work without the slightest additional remuneration. Under these circumstances it would seem to me but reasonable to let him know that his work is appreciated.

Before leaving the subject of San Francisco, I wish to add that I did not see . . . Dr. Baker's and mine the establishment of

a neutral, or quarantine, pen in the stockyards there, for the isolation of tested horse stock, while awaiting shipment, was revived, but unfortunately failed of approval or rather could not be granted when later submitted to the chief of the Bureau in Washington.

It was also suggested to Dr. Baker that if in the future animals like the shipment of "brood mares" which arrived here during October of last year, or if similar cripples or superannuated animals, obviously unfit for transportation, even though not affected with any transmissible disease, should be presented for shipment, he notify the local humane officer or request the association against cruelty to animals to take such action as might seem fit in the premises. A copy of the California "Cruelty to Animals Act" was obtained and the same seems to be a very good law and might serve as the basis for a similar act to be prepared for the consideration of the next legislature.

Meeting of American Veterinary Association.

On the morning of August 22nd I arrived in Toronto. The meeting opened the same day at 10 a. m. and was attended by nearly seven hundred veterinarians, sanitarians and scientists from all parts of the United States and Canada. The Federal Bureau of Animal Industry was represented by its chief, Dr. A. D. Melvin, together with a number of heads of the various divisions of which the Bureau is composed.

In spite of the numerically great attendance the meeting was badly organized and the almost complete lack of committee rooms made it practically impossible for the various sections to get together for the discussion of their respective branches of work, and forced the attendance of all members continuously at the Convocation Hall of the University of Toronto, which was the main place of meeting. An absolute failure to follow the program necessitated the constant attention at all meetings from ten in the morning till, usually, after ten at night, without which one would run the risk of missing the papers or discussions in which especially interested.

Contrary to the previous meeting the subject of bovine tuberculosis did not receive the consideration which was expected by all sanitary officers present, and it would in fact appear that the International Commission on Bovine Tuberculosis had completely exhausted itself with its previous, and now world famous, effort. Only the section on Education presented a "Primer on Tuberculosis," and this was not even read or submitted for discussion, and the attending members were not even allowed to have a peep at its pages. I tried in vain to obtain a copy, volunteering to pay for the making of the same, and was finally promised by the chairman that a copy would be forwarded to me in the course of a week, but up to this date it has failed to materialize. I had, however, later, at Washington, D. C., an opportunity to examine the same, and found it to consist of a very plain but lucid descrip-

tion of the disease, its nature, cause, manner of transmission and economic importance, told in language comprehensive to the veriest tyro and with a total absence of scientific or technical terms. This primer would lend itself well to translation into the various languages of the heterogeneous dairy industry of these Islands and, when copies are ultimately received, I shall strongly recommend its translation into at least the Hawaiian, the Portuguese and one of the Oriental languages, and the wide dissemination of copies thereof among all dairy owners and laborers as well as milk dealers and all others in any way connected with the cattle industry, whether for dairy or beef purposes.

The intradermal test with which we have obtained such fine results here was hardly more than mentioned though some work had been done in an experimental way with it at the Experiment Station of the Bureau of Animal Industry, near Washington, D. C. The number of tests made were, however, absolutely insufficient to lead to any definite conclusions and when a few doubtful reactions were met with, even though admittedly due to faulty technique, the method was at once concluded to be less reliable than the subcutaneous one, and its great advantages of simplicity and cheapness were lost sight of. I did, however, whatever was possible to prevent the official relegation of the method to the junk heap and succeeded in interesting a number of the leading sanitarians, including the chief of the Bureau of Animal Industry, and to obtain their promises of exhaustive experiments with, and further investigation of, the method. I was also promised that the Bureau will prepare and furnish us with the special tuberculin required for the test, free of charge. The work which has been performed here with the eradication of bovine tuberculosis was highly commended, and its continuation encouraged with the promise of every assistance which it is possible for the Federal Bureau to lend in the matter. Our rapid strides in regard to the improvement of the milk supply and especially the installation here of one of the most modern milk purifying plants was quite a sensation, it being somewhat out of the usual for the Washington and New York heads of bureaus and divisions to get information on dairy sanitation and hygiene from the South Seas. In his connection I must mention that I called on the manufacturers of the electric milk purifying machinery, while passing through New York, in order to ascertain whether the plant installed here would possibly be provided with a self-registering and regulating appliance, which would make official supervision a matter of automatically obtained records, thereby insuring to the consumers an absolutely clean and safe product; and I was agreeably surprised to find that the company was then working on that same problem, and that before long a very ingenious device, which will insure not alone an absolutely even temperature, but will automatically regulate the stream of milk passing through the machine, in such a manner that each atom of the product will be exposed to the required temperature at a definite length of time,

making a mistake in the adjustment of the machinery impossible, will be ready for distribution. The device will be enclosed in a glass-faced lockbox, requiring the use of two keys for opening, while a moving finger prints the temperature curve with indelible ink, on a revolving cylinder, in plain sight behind the glass face.

A number of papers pertaining to municipal and state dairy inspection, as well as to dairy farm inspection and the sanitary production and handling of commercial milk, were read and fully discussed, but as these will be received in printed form before long it is not necessary here to discuss them any further. When received, however, an abstract will be made of such papers which may be of local interest to milk producers, and also of such other papers, as those pertaining to glanders or redwater, and will be published from time to time in the official organ of the Board, the *Hawaiian Forester*. Taken all together, I have to acknowledge that the trip was of great value to me, and so indirectly to the Board, though it is a question in my mind whether I benefited more from attending the meeting of the Veterinary Association at Toronto or from the nine days spent in the laboratories of the Bureau of Animal Industry in Washington "talking shop" with my many friends throughout this greatest scientific as well as practical department in the world, learning new methods and getting new ideas. One thing at least I learned while there, namely, that the constant danger of the introduction of either of the great animal scourges of the Orient—rinderpest, foot and mouth diseases, contagious pleuro-pneumonia or surra—calls for the presence here of an official who would recognize such diseases and know how to deal with them before the infection might get out of hand, and the Islands be swept clean of cattle, or the infection transmitted to the mainland. Most of these diseases do not require infected animals as carriers of the contagion, but clothes, utensils, food and various products may, under favorable circumstances, harbor the virus, or an intermediate host, as lice, flies, mosquitoses or rats may act as transmitters. The appended letter, an application from a captain of artillery, for permission to bring a saddle horse here from Manila, and the reply thereto, a peremptory refusal, may serve as an illustration of this.

The Progress of Work in the Division of Animal Industry.

From the appended reports of the assistant Territorial veterinarian, embracing the inspection and quarantine of imported livestock, the tuberculin testing of dairy animals with a view to the eradication of bovine tuberculosis, together with a complete census of the dairy animals in the City and County of Honolulu, the microscopic examination and bacterial count of the milk furnished by the Honolulu Dairymen's Association, together with an itemized, comparative statement of the results of the first and second tuberculin test, showing a reduction of tuberculous infection from more than twenty-three per cent. on the first test to less than five

per cent. on the second test, seem to show that Dr. Case has kept the work well in hand during my absence.

Dr. Case reports the absolute necessity for the purchase of an automobile for the use of this division, in support of which he advances the fact that the Schuman Carriage Co. declines any longer to rent a machine to the division. It is unnecessary to state that the work of the division can no longer be done with horse and buggy, and I would therefore request authorization to make an initial payment of \$375 on a machine, after which the \$100 per month, which is now being paid for rent of a machine, can be applied as instalments on the purchase price of such a machine as the Board may approve of. Mr. Isenberg, who is absent today, expressed it as his opinion that it would be better to purchase a machine, if these conditions can be obtained, than to continue to pay rent for one, but as the purchase price will exceed one thousand dollars, it will, under the laws of the Territory, be necessary to advertise for bids for the same, the advertisements to be inserted ten times. If, therefore, the Board recognizes the necessity of a machine for the efficient continuation of the work of this Division, with special reference to the eradication of bovine tuberculosis, authority is respectfully asked for the insertion of the required tenders for bids in the usual form and way.

Owing to lack of time it will be necessary for me to conclude this report here, the change of meeting days having only come to my notice last night on my return from Leilehua where a case of glanders was reported from the Cavalry barracks. The same condition requires a return to that place without delay.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

HILO ANIMAL QUARANTINE STATION.

Honolulu, August 7, 1911.

Hon. D. P. R. Isenberg, Chairman, Committee on Animal Industry,
Board of Agriculture and Forestry.

SIR: I have the honor to submit for your approval plans and specifications for the Hilo animal quarantine station and such other matters as an absence from the Territory for a period of about six weeks, as hereinafter detailed, would require that you be conversant with.

It is, of course, unnecessary to repeat that practically the entire work of the Division of Animal Industry for the past sixteen or eighteen months, outside of routine work, has been devoted to an attempt to eradicate bovine tuberculosis from the dairy herds of the City and County of Honolulu. How serious a matter this

problem developed into, you, of all the dairymen here, are most capable of appreciating, as the personal loss you must have sustained in supporting the plan of eradication, which suggested itself as the speediest expedient, must have amounted to sums which even a very wealthy man could ill afford to sacrifice. Nevertheless, you preferred to adhere to the principle that the sooner the source of infection was eliminated the sooner a clean herd could be established, and the possibility of being instrumental, even though distantly so, in disseminating the contagion of a fatal human disease, could be done away with.

I doubt whether you yourself could possibly have realized, at the time, the immense importance of your adherence to this principle, as I have to admit that, personally, I considered it cruelly wasteful, and doubted whether the moral effect of it would be commensurate with the immense sacrifice. The ultimate results, however, have shown that your judgment was right, as there can be no doubt of its compelling effect upon every dairy owner who was at all able to emulate it. That the example set by you should, at the same time, make it practically prohibitive for anybody to retain, on milk producing premises, diseased cattle, can only be regarded as a providential blessing, and can certainly carry no opprobrium with it; and the class of milk producers, if the remaining few who still persist in hanging on to diseased animals can be considered a class, is so small that they must of necessity realize their isolated position, and will sooner or later find it so burdensome to explain their position to loyal customers, that they will find it easier to "come into line" and send their reactors to the butcher. The total result of this anti-tuberculosis milk campaign is, however, so gratifying that I feel that I must place the credit for it where it belongs, and as much as I should have wished to claim the same for the Division of Animal Industry, I cannot help but realize, that had it not been for you and your ability to enter into this fight in the way you did, we should have been in the same position as practically every other municipality which has attempted this proposition, that is, we should have either abandoned the fight entirely or we should have fallen back on the "Bang" method, which requires from three to ten years for its accomplishment.

The aim of this communication, however, was to apply to you, as chairman of the Committee on Animal Industry, for permission to attend the annual convention of the American Veterinary Medical Association, which is to be held at Toronto, Canada, August 22-25, and, I trust it is unnecessary to say, that unless I had already received the assurance of your personal approval of my attending this meeting, I should have postponed the above peroration to a more appropriate time. The main object of this convention is, however, the fight against bovine tuberculosis, and a report by a special international committee, composed of the most prominent veterinarians and sanitarians of the American

continent, the chairman of which is the Veterinary Director General of Canada, will be received, and will undoubtedly contain the most advanced recommendations as based on this committee's investigations for the past two years. The tuberculosis control work, as carried on here, has been based almost entirely upon the findings of this committee as reported on at the last meeting of the American Veterinary Medical Association in San Francisco in September of last year, and it will therefore be of great interest to learn what this same committee has to recommend at the present meeting.

That we have advanced beyond their last recommendations in employing the intradermal test, and doing so successfully, may prove of interest to both veterinarians and state sanitary officials attending this meeting in Toronto, as I am of the opinion that bovine tuberculosis cannot possibly be fought with the old subcutaneous test, however reliable it may be, not alone on account of it being cumbersome and expensive, but because it can be applied only to 50 per cent. to 75 per cent. of the animals of a dairy herd at one time. Since last year's meeting when the practical application of the intradermal test was first brought to the attention of the American veterinarians I have failed to see a single article or publication pertaining to this very important subject, and I cannot help but feel that important disclosures are awaiting the attendants of the coming meeting.

Beyond the subject of tuberculosis there are a number of other themes of interest to this Territory to be discussed, as for instance redwater in cattle. This disease causes considerable loss on Maui and Hawaii ranches every year, and as none of the text books mention the disease it will be of interest to learn if any means of combating it has been arrived at in the countries (Canada and Australia) where the same, or similar, diseases have occurred. Glanders, also, comes in for considerable attention and various new methods of diagnosis will be reported on. That this division has an absolutely new method for this purpose, which looks very promising in all of its simplicity, may, when reported on, elicit information which may simplify or abviate further investigations. Live stock sanitary control work, laws and regulations pertaining to the interstate shipment of live stock, and the suppression or eradication of external and internal parasites by natural enemies, are other subjects on which early information can only be of benefit to the live stock interests of this Territory.

In connection with this application for permission to attend the coming meeting I have to state that unless subsidized by the Territory my financial status would not allow of my going. I would therefore respectfully request that in case favorable action on the same is taken a suitable sum be appropriated for traveling expenses and subsistence, out of the funds apportioned for the

Division of Animal Industry for this purpose (\$700 for the biennial period ending June 30, 1913).

As far as the work of the Division during my prospective absence is concerned, I have to say that no more favorable period could have been found, and that the assistant Territorial veterinarian is fully capable of carrying on the work during my absence. There is but little testing to be done, the next retest of the dairy cattle having been set for November. With the municipal milk inspector detailed to assist him, he will be able to do such testing as may be required before the next retest. With an automobile at his disposal the matter of meeting incoming steamers for the inspection of live stock has been much simplified, and so long as the agents and representatives of the various companies comply with the regulations of the Board no difficulties are to be expected.

In regard to the construction of the Hilo quarantine station I submit herewith the completed plans and specifications, which, when approved by the Board, should be turned over to the Superintendent of Public Works for further action. I would only suggest that the successful bidder on the construction of the same be required to familiarize himself with the Honolulu quarantine station in order that he may improve where necessary or avoid the mistakes made there and which my assistant will be able to point out, if not specified in the accompanying plans and description.

A concise report on the work of the Division of Animal Industry for the fiscal year ending June 30, 1911, has been prepared and forwarded to the former president of this Board and copies of the same are submitted herewith.

From the accompanying correspondence you will notice that I have ordered 5,000 ear tags of a new model, approved at the last meeting of the Board and which I believe to be a great improvement over those we have used hitherto, in so far as it is practically impossible for them to come out or be removed except by the use of specially constructed tools.

In conclusion I beg to assure you, Mr. Isenberg, that I fully appreciate the action you have taken in the matter of my attending the Toronto meeting, and, further, that I shall endeavor to get the most possible benefit out of the same, for the good of the Territory.

Very truly yours,

VICTOR A. NORGAARD,
Territorial Veterinarian.

CONSERVATION OF THE SOIL.

(Address of President Taft before the National Conservation Congress, at Kansas City, Mo., September 25, 1911.)

Members of the National Conservation Congress:

At last year's convention of this congress I had the honor and pleasure of delivering an address on the subject of conservation of our national resources, and therein attempted to state what the term "conservation" of our national resources meant, what were the statutes affecting and enforcing such conservation, classified the different public lands to which it would apply, and suggested what I thought was the proper method of disposing of each class of lands. Nothing has been done on this subject by Congress since that time, but it is hoped that the present Congress at its regular session will take up the question of the conservation of government land containing coal and phosphates or furnishing water power, adopt some laws that will permit the use and development of these lands in Alaska and in continental United States, and evolve a system by which the government shall retain proper ultimate control of the lands, and at the same time offer to private investment sufficient returns to induce the outlay of capital needed to make the lands useful to the public. The discussion did not invoke the consideration of any question which directly concerned the production of food.

Tonight, however, I wish to consider in a summary way another aspect of conservation far more important than that of preserving for the public interests public lands; that is, the conservation of the soil, with a view to the continued production of food in this country sufficient to feed our growing population.

We have in continental United States about 1,900,000,000 acres. Of this, the Agricultural Department, through its correspondents, estimates that 950,000,000 acres are capable of cultivation. Of this, 873,729,000 acres are now in farms. The remainder, about 1,000,000,000 acres, is land which is untillable. It is reasonably certain that substantially all the virgin soil of a country where to produce crops has been taken up. It is doubtful whether much of the part not included in farms can be brought into cultivation in which tillage will be profitable.

Our acreage of farms in the last ten years, although the demand for increased acreage by reason of high farm prices was great, was increased only about 4 per cent., or about 35,000,000 acres. It is estimated that upward of 25,000,000 acres that will be reclaimed by a proper irrigation system, and perhaps more, and that a large amount of land can be drained and made useful for agriculture. It is estimated that about 10,000,000 acres

The total improved farm lands in the United States amount to 477,448,000 acres, which is an increase in the last ten years of 62,949,000, or 15.2 per cent. The product per acre actually cultivated increased in the last ten years 1 per cent. a year, or 10 per cent. The total product increased in ten years nearly 20 per cent.

The population in this same time increased 21 per cent. If the population continues to increase at its present rate, we shall have in 50 years double the number of people we now have. It is necessary, then, that not only our acreage but also our product per acre must increase proportionately so that our people may be fed. We must realize that the best land and the land easiest to cultivate has been taken up and cultivated, and that the additions to improved lands and to total acreage in the future must be of land much more expensive to prepare for tillage. The increase per acre of the product, too, must be steady each year, yet each year an increase becomes more difficult. Still, even in the face of these facts, there is no occasion for discouragement. We are going to remain a self-supporting country and raise food enough within our borders to feed our people. When we consider that in Germany and Great Britain crops are raised from land which has been in cultivation for 1,000 years, and that these lands are made to produce more than two and three times per acre what the comparatively fresh lands in this country produce in the best States, it becomes very apparent that we shall be able to meet the exigency by better systems of farming and more intense and careful and industrious cultivation. The theory seems to have been in times past that soils become exhausted by constant cultivation; but the result in Europe, where acres under constant use for producing crops for ten centuries are made now to produce crops three times those of this country, shows that there is nothing in this theory, and that successful farming can be continued on land long in use, and that great crops can be raised and garnered from it if only it be treated scientifically and in accordance with its necessity. There is nothing peculiar about soils in Europe that gives the great yield per acre there and prevents its possibility in the United States. On the contrary, there is every reason to believe that the application of the same methods would produce just as large crops here as abroad.

One of the great reasons for discouragement felt by many who have written on this subject is found in the movement of the population from farm to city. This has reached such a point that the urban population is now 46 per cent. of the total, while the rural population is but 54 per cent., counting as urban all who live in cities exceeding 2,500 inhabitants. This movement has been persistent, and has made it very difficult for the farmers to secure adequate agricultural labor, with an increase in the price of labor which naturally follows such a condition. Still

we ought to realize that enormous advance in the machinery used on the farm has reduced the necessity for a great number of farm hands on each farm.

Mr. Holmes, of the Department of Agriculture, in the Year-book of that department for 1899, points out that between the years 1855 and 1894 the time of human labor required to produce 1 bushel of corn on an average declined from 4 hours and 34 minutes to 41 minutes, and the cost of the human labor required to produce this bushel declined from $35\frac{3}{4}$ cents to $10\frac{1}{2}$ cents. Between 1830 and 1896 the time of human labor required for the production of a bushel of wheat was reduced from 3 hours to 10 minutes, while the price of the labor required for this purpose declined from $17\frac{3}{4}$ cents to $3\frac{1}{3}$ cents. Between 1860 and 1894 the time of human labor required for the production of a ton of hay was reduced from $35\frac{1}{2}$ hours to 11 hours and 34 minutes, and the cost of labor per ton was reduced from \$3.06 to \$1.29.

In 1899 the calculation made with respect to the reduction in the cost of labor for the production of seven crops of that year over the old-time manner of production in the fifties and sixties shows it to have been \$681,000,000 for one year. But while it is possible to say that there may be in the future improvements in machinery which will reduce the number of necessary hands on the farm, it is quite certain that in this regard the prospect of economy in labor for the future is not to be compared with that which has been effected in the last 30 years. Hence we must regard the question of available population and available labor in that population for the cultivation of the fields as an important consideration. My impression from an examination of the figures is that the change in this last decade from farm to city has not been as great in its percentage as it was in previous decades, and, if this be true, it indicates that there is in the present situation an element that will help to cure the difficulty. Farm prices are increasing rapidly, and the profits of farming are becoming apparently much more certain and substantial. While the acreage of the improved land only increased 65,000,000, or 15 per cent., and the total acreage only 4 per cent., the value of the farms in money increased from \$17,000,000,000 to \$35,000,000,000 in 10 years, an enormous advance. This, of course, is due somewhat to the investment of additional money in the improvement of land and somewhat to the increase in the supply of gold, which had the effect of advancing all prices; but the chief cause for the advance is in the increase in the price of farm products at the farm. So great is this increase that the value of the average farm has now gone from \$2,895 to \$5,470, while the average value per acre has increased from \$19.81 to \$40.69. In addition to this, comforts of farm life have been so greatly added to in the last 10 years by the rural free delivery, the suburban electric railway, the telephone, and the automo-

bile, that there is likely in the next 10 years to be a halt in this change toward the city, and more people in proportion are likely to engage in gainful occupation on the farm than has heretofore been the case. Such an effect would be the natural result of the actual economic operation of the increase in the value of the farm product, and the increase in the certainty of farming profits.

It is the business of the country, in so far as it can direct the matter, to furnish the means by which this economic force shall exert itself along the lines of easiest and best increase of production. Of course the government, by furnishing assistance in irrigation, increases the amount of tillable land, and the States, if they undertake the drainage of swamp lands, will do the same thing. The cost of such improvements will be considerable, and will affect the farming profit, but the result generally in such cases is to yield such great crops per acre that the farmer can well afford to pay interest on the increased investment. Increased acreage from any other source is likely to be, however, in more stubborn land, calling for greater effort in tillage and producing less per acre. We may reasonably infer from the high prices of the decade immediately past that everything was done by those who owned land to enlarge the acreage where that was easy or practical, and that what is yet to be brought in as tillable land presents greater difficulties and greater expense. The way in which the States can help to meet future increased demand is by investigation and research into the science of agriculture, and by giving to the farming community a knowledge which shall enable them better to develop the soil, and by educating those who are coming into the profession of farming. It is now almost a learned profession.

The first great step that has to be taken in reformed agriculture is the conservation of the soil. Under our present system the loss to the farms in this country by the erosion of the soil is hardly to be calculated. Engineers have shown how much is carried down the great rivers of the country and is deposited as silt each year at their mouths. The number of cubic yards staggers the imagination. The question is how this can be prevented, as it must be, because the soil which is carried off by this erosion is generally the richest and the best soil of the farms which are thus denuded.

Of the rain or snow which falls on the land, a part evaporates into the air; a second part flows down the slopes to the streams, and is called the run-off. The third part soaks into the soil and sub-soil, and thence into underlying rocks, perhaps to reappear in springs or seepage into streams. This is called ground water. The fourth part is absorbed by organisms, chiefly by trees, grasses, and crop plants, either directly through the tissues or indirectly through the roots penetrating the moistened soil. Erosion is due to the run-off, and its quantity is dependent on

the slope of the farm and also the nature of the soil and its products. Any reasonable slope, and any full cover of forest or grass with an abundant mulch, or a close crop on a deeply broken soil, or a friable furrow slice kept loose by suitable cultivation, will absorb rain and curtail the run-off, or even reduce it to slow seepage through the surface soil, which is the ideal condition. Now, the ground water is the most essential constituent of the soil, because solution, circulation, and organic assimilation are dependent on water. All the organisms and tissues are made up of this solvent of water, and it constitutes a large percentage of the bodies and food of men and animals. The question of the amount or ratio of ground water in the soil is a vital one. If it is excessive it makes a sodden mass, sticky when wet, but baked when dry, so that there is no possible absorption further into it, and it sends on the water that falls on it to erode easy slopes.

The erosion begins on the farm and should be remedied there. Deep cultivation tends to absorb the product of each rainfall and to reduce the run-off. Deep cultivation brings up fresh earth salts to the shorter rootlets, but carries down the humus and mulch to thicken the soil and feed the deepest roots. In flat-lying fields and tenacious soils tile drainage is the best method of relieving the farm from the danger of too great run-off. Deep drainage permits both soil and sub-soil to crumble and disintegrate and through mechanical and chemical changes to become friable and capable of taking on and holding the right amount of moisture for plant growth, while the water which runs out through the drain is clear without carrying the soil with it, and therefore without erosion. Of course, different farms require different treatments. Certain farms require what is called contour cultivation, by which each furrow is to be run in such a way as to level and to hold the water. On hilly lands strips of grass land are grown, called balks or breaks, separating zones of plow land, and they should curve with the slopes; and the soil being carried by the water will be caught by them and constitute them a kind of terrace without effort. The use of forests, of course, in foothills and deeply broken country is essential and should be combined with grazing. They will prevent the formation of torrents by making the mulch and soil deep and spongy. Of course, over all mountain divides the retention of forests greatly helps to prevent the carrying off of the good soil to the valleys below. The proper selection of crops has much to do with the stopping of erosion.

gather these facts from the reports of the Secretary of Agriculture as to the best method of preventing erosion. They are simple and easily understood, but they need to be impressed upon the farmers by education and by reiteration. Then the productivity of the soils might very well be increased by more careful use of commercial fertilizers. In 1907 \$100,000,000 was ex-

pended in fertilizers, but the Agricultural Department is of opinion that one-third of this was wasted for lack of knowledge as to how to use it.

Careful crop rotation is essential because it has been found that the remains of one crop have a poisonous effect upon the next crop if it is of the same plant, but such remains do not interfere with the normal production of a different plant. Then a kind of crop may and should be selected to follow which will renew that element in the soil which the first crop exhausted.

Then there is the organization of the farm on plain business principles by which the buildings and the machinery are so arranged as to make the movement of crops and food and animals as easy and economical as possible. A study as to the character of the soil and the crops best adapted to the soil; the crops to be used in rotation for the purpose of strengthening the soil—all these are questions that address themselves to a scientific and professional agriculturist, and which all farmers are bound to know if the product per acre is to be properly increased. We have every reason to hope, from the forces now making toward the education and information of the farmer, as to the latest results in scientific agriculture, that the country will have the advantage of improvement in our farming along the proper lines. Further agricultural development is to be found in the breeding of proper plants for the making of the best crops, while the growth of live stock is made much more profitable both to the owner and to the public by improving the breed and the infusion of the blood of the best stock.

The improvement in agricultural education goes on apace. All the States are engaged in spending money to educate the coming farmer, and this system is being extended so that now we have the consolidated rural school, the farmers' high school, and the agricultural college, and one who intends to become a farmer is introduced to his profession soon after he learns to read and write, and he continues his study of it until he graduates from his college, and applies for a place upon the farm.

The land-grant colleges established by the Federal Government have vindicated the policy in making the grant. Now the department employs 11,000 persons, many of whom are engaged in conducting experiment stations and spreading information all over the country. The cooperation between the State agricultural school system and the Federal Government's publicity bureau and experimental work is as close and fine as we could ask. It is difficult to justify the expenditure of money for agricultural purposes in the Agricultural Department with a view to its publication for use of the farmers, or to make grants to schools for farmers, on any constitutional theory that will not justify the Government in spending money for any kind of education the country over; but the welfare of the people is so dependent on improved agricultural conditions that it seems wise to use

the welfare clause of the Constitution to authorize the expenditure of money for improvement in agricultural education, and leave to the States and to private enterprise general and other vocational education. The attitude of the Government in all this matter must be merely advisory. It owns no land of sufficient importance to justify its maintenance of so large a department or of its sending into all States agents to carry the news of recent discoveries in the science of agriculture. The \$50,000,000 which has been spent for research work in the department, however, has come back many fold to the people of the United States, and all parties unite in the necessity for maintaining those appropriations and increasing them as the demand shall increase.

It is now proposed to organize a force of 3,000 men, one to every county in the United States, who shall conduct experiments within the county for the edification and education of the present farmers and of the embryo farmers who are being educated. It is proposed that these men shall be paid partly by the county, partly by the State, and partly by the Federal Government, and it is hoped that the actual demonstration on farms in the county—not at agricultural stations or schools somewhere in the State, but in the county itself—will bring home to farmers what it is possible to do with the very soil that they themselves are cultivating. I understand this to be the object of an association organized for the improvement of agriculture in the country, and I do not think we could have a more practical method than this. It is ordinarily not wise to unite administration between the county and State and Federal Governments, but this subject is one so all-compelling, it is one in which all people are so much interested, that cooperation seems easy and the expenditure of money to good purpose so free from difficulty, that we may properly welcome the plan and try it.

On the whole, therefore, I think our agricultural future is hopeful. I do not share the pessimistic views of many gentlemen whose statistics differ somewhat from mine, and who look forward to a strong probability of failure of self-support in food within the lives of persons now living. It is true that we shall have to continue the improvement in agriculture so as to make our addition to the product per acre 1 per cent. of the crop each year, or 10 per cent. each decade; but considering what is done in Europe, this is not either impossible or improbable. The addition to the acreage in drainage and in irrigable lands will continue to go on. The profit to the State or to the enterprise which irrigates or drains these lands will become sufficient to make it not only profitable, but necessary to carry through the century, and we may look forward to the middle of this century, when 100,000,000 of people shall swear fealty to the starry flag, and when America will still continue to feed her millions and feed them well out of her own soil.

Washington, D. C. October 5, 1898.

THE COLLEGE OF HAWAII.

DEPARTMENT OF EXTENSION WORK—CORRESPONDENCE COURSES.

PURPOSE.

The College of Hawaii, an institution supported by taxation, should extend its services to the people by all possible ways compatible with the best methods of college administration. While adequate provision should be made and fostered for collegiate work in residence, yet there exists in the community a large class of persons who for one cause or another are unable to adjust themselves to our formal system of education. Such persons manifestly have some claim upon the Territory for assistance in education outside the formal system. By correspondence study such persons may acquire knowledge in accordance with their requirements and capacities. While there are very good reasons for students coming to the College for their instruction, there are also good reasons for the College going to the people; and more especially when the College offers instruction in subjects pertaining to the vocations of life.

That people may be taught in many of the subjects of the school and college curriculum through correspondence study is a demonstrated fact, and while the method lacks some of the advantages of resident study, it has certain advantages of its own. Among other things, it has a tendency to encourage self-reliance and self-determination. It affords earnest persons the opportunity of working and studying at the same time, and each student gets individual instruction. On the other hand, advanced subjects requiring extensive laboratory equipment are at a disadvantage, as the manipulation of laboratory apparatus may not be taught by correspondence.

The specific classes of persons that correspondence study is designed to benefit may be enumerated as follows:

1. Those who wish to learn but who are prevented from attending the College by exigencies of employment or place of living.
2. Those who find new demands made upon them by the progress of the industry in which they are engaged.
3. Those who are engaged in manual employments and who wish some mental activity to occupy their leisure hours.

PLAN AND SCOPE.

The College offers through correspondence study the following subjects:

Soils and Crops, Plant Life, Horticulture, Poultry Husbandry, Domestic Science, Zoology.

The grade of instruction in these subjects is in accordance with the ability and attainments of the students. Students taking any subjects by correspondence shall be not less than 15 years of age and shall not at the time of taking the course be in attendance at school.

Instruction in the subjects mentioned is given by written lessons or assignments, the student returning a written report on each lesson or assignment according to the direction of the professor in charge. These reports are carefully examined and returned to the student with such corrections, explanations or suggestions as may be to the interests of the student. If each report meets the required standard, a new lesson or assignment is sent.

A subject consists of weekly assignments and each assignment may contain one or more lessons. The course of instruction terminates with the close of schools in June. No preliminary examination is required, but students must satisfy those in charge of the course that they can read and write English fluently. Application blanks may be had on request and the College will offer assistance and suggestion in the choice of subjects. Students are expected to complete at least one course in the time specified for the course.

A fee of \$5 is charged for each full course of 18 assignments. For additional courses a reduction of one-half for each course is made. The fee is intended to pay the cost of the lessons and postage one way. If a student takes less than half of the assignments one-half the fee remaining above the cost of materials used is refunded.

SUBJECTS IN DETAIL.

COURSE 1. *Soils and Crops:* Readings and reports on the origin and formation of soils, their physical, chemical and biological properties, relation of soil properties to soil managements, the adaptation of crops to soil types, and the essentials of crop-producing power. The studies of crops will consist of readings and reports on the leading crops of the mainland and Hawaii, their geography, economics of production, commercial importance, products, uses and culture methods.

COURSE 2. *Plant Life:* Students registering in this course may choose an option between two lines of study. 1. A survey of the principles of botany, including the structure and physiology of plants and animals; the morphology, evolution, and classification of plants; the biology and economic botany. The text by Bergen and others may be furnished. Emphasis will be laid on the practical aspects of plant life, especially such aspects as are exemplified in the flora of the Hawaiian Islands. 2. A study of comparative plant life as a part of the nature study work of the elementary school. This course is planned primarily for school-teachers.

Two manuals will be furnished. This course demands a larger amount of field and observational study than option 1. The faithful performance of the work outlined in either of these sections should give the student a general knowledge of the fundamentals of plant structure and growth.

COURSE 3. *Practical Horticulture:* Students registering in this course elect one of the following subjects: fruit-raising, vegetable gardening, or floriculture. In addition to regular textbook assignments, the reading of specified bulletins relating to these matters is required, and the performance of experiments. Students taking this course should have access to some piece of land, however small, upon which they can raise crops for experimental purposes. The practical problems of tillage, irrigation and drainage, fertilizers, spraying, seedage, insects and fungi will thus be worked out on the basis of actual experience.

COURSE 4. *Poultry Culture:* This course treats of the underlying principles of the profitable production of poultry products. The essential business elements which lie not only in the qualification of the poultryman but also in the quality of the stock investment will receive special consideration. The care and management of all the operations from the time the egg or the chick is produced until it reaches the consumer will receive much attention. Each student is urged to be actively engaged in some part of the business while taking the course, for observation, study and work go hand in hand in successful poultry management.

COURSE 5. *Cooking:* This course gives some methods for the simpler dishes used in the diet. It includes text assignments giving something of the needs of the human system as regards the elemental foodstuffs, the preservation of food, with a few special diets for children and the sick.

COURSE 6. *Zoology:* The course is intended to give a grounding in the subject of general zoology with especial reference to its economic aspects. It includes text assignments, written lectures and simple dissections of a number of common animals with a view to gaining an understanding of the salient points in their comparative anatomy. Notes of the life histories, form and habits of animals are included in order to show the adaptation of animals to various circumstances and conditions of environment. The course is intended for teachers and others with a taste for or a knowledge of the facts and materials of Zoology.

PROCLAMATION.

ARBOR AND CONSERVATION DAY.

The practice, now widespread on the mainland, of **setting aside one day each year as Arbor Day** began in Hawaii **six years ago**. Since then, here as well as elsewhere, the larger movement for the conservation and development of all natural resources, of which **Arbor Day** represents only one phase, has made great progress. **Two years ago**, in consequence of the quickening of the public conscience and interest in these matters and the practical results therefrom in the inauguration and extension of active work along these lines, the scope of the day was enlarged.

Accordingly, I hereby designate Friday, the 10th day of November, 1911, as **ARBOR AND CONSERVATION DAY** for the Territory of Hawaii, and recommend that on that day appropriate exercises be held in all the schools of the Territory and that a part of the day be devoted to the planting of trees and shrubs.

(Seal) Given under my hand and the Great Seal of the Territory of
Hawaii at the Capitol in Honolulu this 28th day of October,
A. D. 1911.

W. F. FREAR.

By the Governor,

E. A. MOTT-SMITH,
Secretary of the Territory.



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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection and growing.

The list includes both forest and ornamental trees, such as Silk Cotton, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 25 to 50 cents per ounce. The seedlings may be had for 2½ cents each except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugh, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications to SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 100, HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. VIII.

DECEMBER, 1911.

No.

COURSE OF STUDY FOR ELEMENTARY SCHOOLS

(Report by T. H. GIBSON, *Inspector of Schools*.)

At the last meeting of the Commissioners of Public Instruction held June 11, 1911, there was some discussion of our course of study, and in the course of this discussion it was suggested to the superintendent that a committee be appointed to consider the advisability of preparing a separate course of study for the rural schools—that is, for the miscellaneous schools of one, two, three rooms, etc., and it was decided that the matter be taken up by the superintendent at a meeting of the supervising principals.

As the “arranging and re-arranging of studies to be pursued” does not have the prominence to be given to any particular branch of learning, it comes under the province of the inspector of schools, according to law, the matter was referred to me for consideration.

I have given this important matter a good deal of thought, having been so long connected with the schools of this Territory. I am fairly well informed as to the development of the present course of study. It is not the work of one or a few men, but the outgrowth of the ideas and work of the leading educators and school officials of these islands. It is the result of the study and work of such men as Richards, Armstrong, Hitchcock, Baldwin, Bishop, Alexander, W. R. Castie, M. M. Scott, A. T. Atkins, Townsend, Judge Cooper, and E. A. Mott-Smith and others. Our later revisions have had the benefit of the advice and criticism of such educators and experts as Dr. Brown, late Commissioner of Education at Washington, Col. Parker of the celebrated County Normal School, Miss Zonia Baber and Miss Flora J. C. of the education department of Chicago University, Prof. J. Dewey, and others, some of whom have more than a national reputation as educators.

Before making any recommendations of my own on the subject, I decided to consult leading educators and college men connected with educational affairs throughout the states. I wrote a personal letter to each describing conditions here and stating the character of our school population. I enclosed a copy of our Course of Study and asked for suggestions and criticisms in regard to the same. I quote from the replies received up to the present time:

Prof. Chas. E. Bessey, University of Nebraska: "I realize that you have a problem which is entirely different from that which confronts us in the States, and as I look over the printed course of study it seems to me that you have mastered the situation in a most excellent way. I am greatly pleased with what you have outlined and I think especially that your plan of 'creating the necessity for language' in what you plan for the children to do is admirable. In this way you will accomplish the first great thing to be done, namely, that of bringing the children to an understanding of the English language

"Next to the acquisition of the English language by these people of many nationalities, an industrial training is of most importance, and since the work in the Islands is largely agricultural, it is desirable that the grammar schools should articulate with the agricultural college. So I commend this feature of your plan very thoroughly. . . . One thing must not be lost sight of, and that is that year by year all over the world we are becoming *more and more mechanical*; that is, even in agriculture and horticulture and allied subjects people are depending more and more upon mechanical devices, so that it is imperative that the industrial work that you give the pupils shall have much of the mechanical brought in. It is not enough that they should be taught to get out into the gardens and fields for agricultural purposes, but they must be taught to understand and to know mechanical problems.

"The only question that I have in connection with the printed course of study is whether you have not made the 'nature study' a little stiffer and harder than it should be for the degree of development of the children. This question is raised not as a finality, but merely as a question. However, this can be determined by trial.

"I like *very much* your suggestion of 'collecting' under nature study. If you can extend this part of the nature study, I am sure you will be helping to make it more efficient.

"I shall be very glad to continue this correspondence, for I am greatly interested in it."

(Note). *Nature Study*. In speaking of nature study, Dewey says: "The aim of the elementary school is wrong. It should not be knowledge but to organize the instincts and impulses of children into working interests and tools." The stress should be on methods not results. Not that we do not want results but that we get better results when we transfer the emphasis of attention to the problem of mental attitude and operation. We need to develop a certain active interest in truth and its allies, a certain disposition of inquiry, together with the command of the tools that make it effective and to organize certain modes of activity and observation, construction, expression and reflection.

Jas. E. Russell, Dean, Teacher's College, Columbia University: "Upon examination of the Course of Study which you sent, I find it very difficult to judge of the work which you plan to do in your

schools. Your plan for teaching English, which is indicated briefly in the course of study, and to which you call attention in your letter, is sound in principle and has proved successful in the foreign districts in our large cities."

He then refers to courses of study in larger cities where the school authorities have been confronted with the problem of how best to deal with non-English speaking children.

Chas. F. Wheelock, Asst. Comm. Education, Inspection Div., N. Y. State Ed. Dept.: "It would seem to me that the main purpose of your instruction should be to make this polyglot aggregation of children fairly intelligent regarding ordinary things of life and to give them the ability to express what they know in intelligent English. The Course of Study that you have submitted seems to be, in the main, a most excellent one. In minor details I should suggest changing it, but possibly your experience may prove that I am wrong. . . .

"The Nature Work. The work seems to be most excellently arranged. Nature Study looks a little heavy in the advanced grades. Experience would be needed to determine whether it could be done or not.

"I find it frequently true that children have powers beyond what they are ordinarily credited with, and that many of the limitations that we have been accustomed to put on courses of study, because we believe the children incapable, were really unnecessary."

He criticizes somewhat the industrial work if it be intended that boys and girls are required to do the same work—thinks there should be a division. Also in number work of the 3rd grade he criticizes the limitations of numbers to 1000 and the multipliers and divisors to two figures. He considers the limitations unwise, as he says "in the third grade the children should begin to do a little generalizing and be able to imagine some things they have never seen.

"I fear that I have not given you anything of very great value, but I wish to assure you that I have gained something myself from your letter and from the course of study which you sent me."

(Note.) Whether the nature study be considered too heavy in the advanced grades depends much upon the manner of presentation. The work was not intended to be treated from a scientific standpoint, but simple experiments and observation of various processes in nature and the arts—a knowledge of common things about us. The more advanced grades are found mostly in the centers of population near the various industries and such children are brought more or less into contact with pulleys, machinery, sugar mills, wharves, etc. As I said before, whether this part of the nature study be heavy or the reverse depends altogether upon the method of presentation of the subjects.

In regard to limiting the number work in the third grade in the making of bills, for instance, to articles the kind, measure and prices of which are known, the idea was to warn teachers against the use of words without thought—particularly necessary on ac-

count of the many non-English speaking children in the schools. Limiting operation of numbers to 1000 was done so that children would work only with numbers which were possible of comprehension by them.

Prof. Henry W. Holmes, Division of Education, Harvard University: "In general, it seems to me that your course of study is excellent. Naturally everything depends on the way in which it is carried out, but so far as your program on paper is concerned, it is unquestionably commendable. I have only one doubt about the general character of the program: it seems to me too difficult. It is not too meager nor graded too low for a good city system of schools in the states. I should fear, therefore, that teachers would find it a hard program to carry out under your conditions. But of this point you can best judge for yourself. . . .

"I cannot, I regret to say, criticise your elementary school program in great details, but I will add here one or two remarks on certain particular points, which may indicate for you the basis of my general reaction as given above. I shall give you rather the points of adverse criticism than those of approval, not because the former would be more numerous if I spoke of each detail in the course, but because I suppose you wish suggestions for improvement rather than mere praise.

"1. Are the stories told in language work the native stories; or are they stories of American, English and German inheritance? So large a proportion of your school population is oriental that it would seem highly desirable to have your fairy tales, fables, rhymes, etc., very largely oriental in origin.

"2. Are the punctuation marks to be taught in each grade carefully listed? If a more general recommendation to teach punctuation is given out, it is likely that no one teacher will feel responsible for the teaching of particular marks.

"3. Your nature study program seems to include rather too much observation and too little actual growing of plants or animals, etc., although this element is not entirely lacking in it.

"4. Your illustrative work, which stands, I suppose, for drawing, seems to aim rather more than it should at the development of mere technical skill with the pencil and brush, and the capacity to make working drawings or semi-scientific representations of objects. . . .

"5. Your course in geography seems to emphasize too much and too early the scientific study of the subject. The social side—conditions of life the world over—should be very strong at the beginning, and should yield only at the end to the scientific aspects of the subject.

"It would seem to me that you introduce technical grammar rather too early in Grade IV.

"Your history seems to me to emphasize too much at the beginning American history; it would seem natural to start some-
very early on the

"8. Your course in nature study, introducing scientific experiments in Grade V, seems to be too advanced. . . ."

(Note). In regard to the statement that the course of study seems too difficult it may be said that that depends upon how exhaustively each subject is treated in the different grades. If larger or vital points of subjects are taken up and minor details left out the course is not so difficult as it may appear at first glance. The difficulty comes in attempting to teach too many things in the subjects not worth teaching.

1. In answer to question "1" I would say that the stories told in language work comprise stories of Hawaiian, Japanese and Chinese origin as well as those of English and German inheritance. In the first grade, for instance, we have "Kila, the Canoe Builder," tales from Hawaiian history, "Hok Lee," Chinese, "The Monkey and the Crab," Japanese, fairy tales from China and Japan, etc. Anglo-Saxon stories predominate to inculcate the ideas of our civilization.

2. Punctuation is part of writing and as the sentence is written on the board the child is familiarized with the necessary punctuation marks as with the words used.

3. This criticism is just so far as the nature study program is set forth in the manual, but the growing of plants, etc., is very generally continued in school gardening and manual work.

4. Illustrative work includes modeling in sand and clay, chalk modeling (land forms) on blackboards, pencil and crayon work, pen and ink work, painting in water colors, marking and dramatization, not with the idea of developing technical skill, to make working drawings or semi-scientific representations of objects, but to express thought through the organization of the child's powers.

5. Nature Study and Geography in the lower grades do emphasize the social side of the study very strongly as shown in the detailed outline of the course of study.

6. The directions in the course which seem to require the teaching of formal grammar in the lower grades may be misleading but the intent and practice is only to familiarize the child with the terms and forms used in the study of grammar while in close connection with the expression of the thought, the natural way of learning the construction of language. While the direction is to teach the possessive case, for instance, it is not intended that the child is to learn a grammatical definition or rule, but that he is led to observe its form and while the teacher calls his attention to this the proper term may be used, "possessive," and so with other grammatical terms, as noun, verb, phrase, sentence, etc. When speaking of words there is no more reason why the teacher should not use the proper term than there is when he is talking of numbers and uses the term divisor, multiplier or subtrahend. In this way the child is familiarized with the forms of grammar by hearing them when attention to them is necessary, all through the grades. In the sixth and seventh grades, children

may use a grammar for reference as they would use a dictionary and when they reach the eighth grade the study of formal grammar will be comparatively easy.

7. The history work does begin at home. We have Hawaiian legends, tales from Hawaiian history, national stories adapted, Chinese and Japanese stories and myths, old stories of the east which describe conditions of a primitive people, stories suitable for festivals, as for Kamehameha Day, Thanksgiving, Christmas and Easter. In these legends and stories we have the beginning of history teaching and it is not until the fifth grade that there is any attempt to teach formal history.

J. C. Boykin, Assistant Commissioner, Bureau of Education, Dept. of the Interior: "There appears to be little actually in the course that can be seriously criticized with substantial reason. The characteristics are such as may be expected in view of the conditions described in the accompanying letter, namely, the emphasis laid upon language and the prominence of manual work.

"It may be doubted if it is advisable to begin the study of the structure of the language as early as the first grade, as the reference to 'nominative and objective cases' seems to indicate. It is not clear how such instruction is given, however, and it is probable that those who prepared the course did not intend that an attempt should be made to teach formal grammar to such young children. The amount of memory work and the unusual stress laid upon the correction of errors of speech are noticeable, and for schools under ordinary conditions might be open to criticism, but under the circumstances such methods are probably justifiable.

"The amount of manual work in the Hawaiian schools seems to be greater than is generally required in the schools of the States, but such instruction appears to be well suited to the conditions of the people of the Islands, and the specimens exhibited at the several expositions have been distinctly creditable.

"The fault of the course seems to be less in what it contains than in what it omits. There is nothing to indicate relative values; to show how much time should be given to each branch; or to emphasize essentials. All is put upon the same basis, and a word or a phrase is as much as is given to any topic, whether it be 'Pioneer period of American history from 1492 to 1850,' which might well occupy 40 weeks, or 'how waste matter goes off,' for which 40 minutes might be sufficient.

"The course is meagre to a degree. It is difficult to understand how such a brief list of topics can produce desirable uniformity in instruction in the schools of the territory, or even how it can be considered a 'course of study' in the usual sense. Perhaps it is not so intended, for on page 19 it is directed that 'each teacher, with the assistance of the principal, must prepare and place on file at the beginning of the term a daily program, an outline of the term's work,' etc. In other words, each teacher must make his own course of study, presumably observing as far as may be the hints in the published course. General these are so few as

to interfere but little with the teacher's individuality if he is fortunate enough to possess such a quality, but on the contrary they are not sufficient to be a guide to the beginner or to the teacher of moderate ability and attainments. An example of this may be found on page 17 under the heading 'Proper use of language,' for Grade VIII, namely, 'Review and commit to memory the fundamental principles and rules of English composition in connection with the daily work.' It may be expected that this will be construed in as many different ways as there are teachers, and may require anywhere from five to five hundred hours of school time in a year. 'Illustrative work' is specified for all the grades, but there is so little of detail for the higher grades that the teacher is left almost wholly to his own resources.

"Such meagreness, or vagueness, is noticeable throughout the document, but there is a marked exception to it in 'History and Language' for the higher grades. The requirements in this respect for Grade VIII are truly formidable, including American history under the constitution, the French Revolution, the Conquest of India, the Union of the North German States, Government of the World, Hawaiian history, and several other topics. Any one of these might easily occupy months of study and to introduce them all will necessarily mean scrappy and disjointed work; and history, of all subjects, should be pursued in an orderly and consecutive manner, and not as a series of disconnected incidents.

"It is recommended, if a new course is in preparation, (1) that it be made more specific and direct in statement, leaving less to the individual judgment of the teacher, for not all teachers are of equal ability; (2) that it describe each year's work in greater detail, and that in each grade the work prescribed be approximately sufficient to occupy the year; (3) that in each study the minimum number of hours per week and of weeks per year be specified, the time being so arranged as to leave a reasonable margin to be apportioned according to individual preference or to local conditions."

(Note). Mr. Boykin's objections are answered in a large measure in the preceding notes and by saying that a detailed outline has been prepared for the first four grades and is being prepared for the grammar grades also, which divides the work by terms and months. In respect to the criticism in History in Grade VIII it can easily be seen that the objection is caused by a misconception of the work. The commissioner's understanding of what is intended is the correct one, that is that the War of the Revolution is the real history work of that year and the incidents and parts of European history referred to are used as collateral work.

P. P. Claxton, Commissioner of Education, Washington, D. C.: "I have just looked over the course of study of the schools of the Hawaiian Islands, which you sent to this Bureau sometime ago, and also the correspondence in regard to it. I have just come

into the office and have not had time to study the course of study as fully as I would like to, but I want to say that I am very much pleased with it. It seems to me that you have done well in trying to adapt it to the needs of the children of the Islands. There are, however, two or three things that I may want to write about more fully when I have a little more time.

"I am wondering if in all the lower grades you might want to combine nature study and geography. The two are so very much alike that the nature study can probably be done better as a part of the geography work, and the geography work will be enriched thereby.

"The number work follows a plan very popular in many parts of the United States, but this plan has long seemed to me defective, while I feel quite sure that the subject can be taught more simply and effectively by giving the first half year to counting, and the second half year to counting by tens, so as to lay a foundation for the understanding of our decimal system of writing, and writing numbers. The second year should be given to addition, subtraction and comparison, and the numbers dealt with should not be so narrowly limited. Children who learn to count, and to count by tens, can just as well do problems involving thousands and tens of thousands. The third year should be given to the facts of multiplication and their application in multiplication, division, fractions, and ratio. I do not believe it is well to attempt to teach the ordinary four processes at the same time. There are in fact seven processes; the first three go together, and the second four, and they should be grouped thus in teaching. A long experience has convinced me that much time may be saved and much power gained by teaching arithmetic in this way.

"I do not clearly understand whether you expect technical grammar to be taught in the grades below the eighth. If you do, it seems to me that it is not best. Children as a rule do not understand the generalizations, and an attempt to learn them stands in the way of their gaining a real mastery of language.

"Spelling, of course, is best taught in the lower grades in connection with composition work. In the fourth and fifth grades there is need for a book that classifies words according to their spelling a little better than the one you mention.

"I want to commend most heartily your plan of trying to base the development of language on the child's understanding of his own life and occupations, the language thus growing out of its own experience. I wish also to commend your use of what you call national stories, also repeated stories and rhymes. I know nothing more good or useful in teaching language to small children than such stories as *The old woman and her pig*, *The house that built*, etc.

"I think Mr. Boykin's adverse criticism of the history work of the second grade is based on a misunderstanding of what you intend. I suppose that you intend to make the period of American history designated the real history work of that year, and that

the incidents and parts of European history referred to are to be used as collateral work, thus following the Herbartian idea as set forth especially by Doctor McMurry in his book on *Special method in history*. If this is so, I commend it most heartily.

"If at any time you should come to Washington, it would give me the very greatest pleasure to talk with you about your work in Hawaii. I am sure you will have much to tell me that will be very interesting and valuable. . . .

"P. S.—To make this course of study serviceable to the teachers, it ought to be outlined in detail with some suggestion as to order of the subjects in the several years, to the time to be devoted to the various parts of the subjects, and the means of correlating them. If the Bureau can be of any service in helping you do this, let me know."

The following is a copy of a course of study for country schools proposed by the N. E. A. in report for 1905, pages 85-86, with some notes on causes of retardation:

COUNTRY SCHOOL COURSE.

(The course below is given only as a sort of guide and a standard which all country schools may strive to reach.)

First Year.

Reading	Writing
Spelling	Music
Language	Nature Study
Number work	General exercises

Second Year.

Reading, using in part themes from nature, the farm and the home	Music
Spelling	Hygiene
Language	History
Number work	Drawing
Nature Study	General exercises
	Writing

Third Year.

Reading; nature stories forming a part	Geography
Spelling	Hygiene
Language	History
Arithmetic	Nature Study
Music	General exercises

Fourth Year.

Reading; country life literature in- cluded	Geography; should include the dis- tribution of farm products.
Spelling	Drawing
Language	Nature Study
Arithmetic	General exercises
Writing	Music

Fifth Year.

Reading; including stories of our country and lessons in agriculture and home economics

Spelling
Language
Arithmetic
Writing
Music
Drawing

Geography; including in part physical geography in respect to the work done by nature's forces in preparing soils

History
Physiology
Nature Study
General exercises
Literary society work.

Sixth Year.

Reading; lessons should include animal life and adventure.

Spelling
Language
Arithmetic
Writing
Music
Drawing
Geography

History
Physiology; including principles of nutrition and food values
Co-operative enterprises
Agriculture; 1st half-year, the affairs of agriculture; 2nd half-year, the soil.
General exercises; for boys, wood-work; for girls, sewing.

Seventh Year.

Reading and Literature
Spelling
Arithmetic
Grammar
Writing
Geography; combined with physical geography

Music
History
Co-operative enterprises
Agriculture; farming schemes
General exercises
Literary society work.

Eighth Year.

Reading and Literature
Spelling
Grammar
Arithmetic; including farm problems, land surveying and farm statistics

Geography
History
Agriculture
General exercises
Literary society work

CAUSE OF RETARDATION IN COUNTRY SCHOOLS.

(Report of N. E. A., 1905, Rural Schools, pages 50-51.)

One of the chief reasons for the poor results in the teaching of the common branches, too often presented, are given as good and sufficient reasons why no improvement could be attempted. It is assumed that the poor results are due to lack of time in the school and that there is no time for anything else.

The second objection is that the course of study is now over-crowded. In rural schools especially, the variety and number of subjects renders it impossible to organize and instruct additional classes in new subjects.

As to the first objection, it may be said that the poor results in the teaching of the common branches is not due to lack of time. The part of pupils so much as poor teaching and lack of organization.

The second objection is likewise not well founded, because the overcrowding of the course is not due to the number of subjects but to the attempt to teach too many things in these subjects which are not worth the teaching.

The subject matter in the common school course of study needs a critical revision, not so much with the idea of eliminating entire subjects as for the purpose of cutting out matter now found in most textbooks in the treatment of these subjects, and upon which much time is spent in the school without profit to pupils.

Textbooks are made to sell; most publishers recognize that certain detail of treatment of a subject is regarded as of vital importance by one superintendent while another regards it as utterly without value. The argument of the publisher from the commercial standpoint is that if this detail is supplied, it will meet the requirements of one, and can be omitted by another, and thus the book can be accepted by both.

In the rural schools the supervision is necessarily lacking in effectiveness, and the teachers, not feeling themselves competent to make proper eliminations, undertake to teach everything in the books, which was made to include everything which anybody might wish to teach.

The Course of Study—What is it? What is its purpose?

A course of study should represent the policy of the Department of Public Instruction in regard to the subjects to be taught in the public schools, so arranged as to suggest their relation to each other, their relative importance, and the methods of teaching. It is the Charter, the Constitution.

The Term Outline is an adaptation of the course of study for each individual school or group of schools, giving the work in each subject in detail and apportioned to each month or divisions of the term.

The Lesson Plan is a detailed statement of the methods used in teaching the different subjects.

The Daily Program shows the amount of time devoted to the study of each subject. This is important as showing the time given to each subject and also the economical use of the school hours by the teacher.

Considering the favorable attitude of such men as I have quoted from towards our present course of study, and remembering its evolution, I would not at the present time recommend any radical changes. It is elastic enough to be adapted to all our conditions and lacks detail enough to leave room for the initiative and originality of the teacher. All agree that it is sound in principle and good so far as it goes. In fact, you have never heard an unfavorable criticism of it when clearly understood from any student of school administration, from any educational expert, or from any organization which has gained for itself a reputation for intelligent interest in public school affairs.

At present there is general interest being awakened in regard to school curriculums all over the United States; there is a very general feeling that the courses of study should be changed in some way to better meet the needs of the child—his future as well as his present needs. Formerly the only thought of the teacher was the training of the child's mind. Now we are gradually realizing that the child is made up of soul, body, and clothes, as well as mind, and that it is this child in his entirety that comes to school and this child that the school must provide for. As I say there is at present a great unrest in this matter and it seems to me that it will be a wise policy to wait and see just what direction this movement will take and what light will be shed upon the subject by the study and investigations which are in progress.

When the industrial schools which are contemplated have been started and fully under way, it may become necessary to make some changes in the course to meet the changed conditions, but at present I believe no change is necessary but that all seeming difficulties can be met by preparing detailed outlines, following the requirements of the course, and adapted to the several districts of the islands.

Therefore I recommend that each Supervising Principal prepare a type term outline adapted to the schools under his supervision—an outline for a one, two, three-room school, etc., copies of these outlines to be sent to the Department and to the several local principals to be by them, under the direction or with the approval of the Supervising Principal, adapted to meet the needs of their schools. From the term outlines filed in the office by the Supervising Principals, the Department may, by selecting the best from each, prepare type outlines which will better meet the needs of the schools in general and will serve as a working basis for particular outlines by all supervising principals and thus bring about more uniformity in school work.

I believe that, if all these suggestions and instructions are intelligently carried out, and if we all work faithfully and loyally together, the work accomplished this year will place the schools of our territory on a higher plane than they have yet occupied.

DEPARTMENT PUBLICATIONS.

For many years it has been a standing joke that public documents were dry and uninteresting; indeed that they did little better than to "cover the earth." But times have changed and now, especially from those interested in agricultural research, such publications find a hearty welcome.

Readers of this magazine should know, the U. S. Department of Agriculture issues a "Monthly List" giving the titles of all the publications put out by its several Bureaus and Divisions. This convenient pamphlet will be sent free to anyone who applies to the Division of Publications, U. S. Department of Agriculture;

Washington, D. C. From it one may check off the publications in which he is interested. An application to the appropriate bureau usually brings the report requested, without charge, and for the few for which payment is required the amount is merely nominal.

But as many of the most valuable reports soon go out of print and can then no longer be supplied by the Department of Agriculture, it is well to have a second string to one's bow, such as is supplied by the price lists of the Superintendent of Documents, Government Printing Office, Washington. This official has charge of all public documents remaining after the needs of the several departments have been supplied. His office is the repository of all extra copies.

The Superintendent of Documents is authorized to sell at cost any public document in his charge, the distribution of which is not otherwise provided for.

The accumulation of government publications in this office amounts to several millions, of which more than a million are available as a sales stock, covering nearly every important Department, Bureau, and series. Many rare books are included, but under the law all must be sold "at cost," regardless of their age or scarcity. Of many of the most valuable works but few copies remain.

In ordering, it should be borne in mind that most of the books have been in stock some time, and are apt to be shopworn. In filling orders, however, the best copy available is sent.

This office possesses the most complete collection of United States Government publications, and employs several document experts in reference work. Information regarding public documents will gladly be supplied.

As the sales officer for Government publications he is anxious to inform the people how and where to secure documents they may desire.

PRICE LISTS.

Descriptive lists of United States public documents relating to special subjects that are for sale by the Superintendent of Documents at Washington are sent on application. The practice of publishing lists embracing a variety of subjects has been discontinued. The numbers and subjects of the lists now available follow:

- | | |
|--------------------------------------|--------------------------------------|
| 10. Laws of the United States. | 21. Fishes. |
| 11. Food and diet. | 22. Superseded by Price List 52. |
| 12. Superseded by Price List 51. | 23. Dairy industry. |
| 13. Superseded by Price List 50. | 24. Indians. |
| 14. Superseded by Price List 51. | 25. Transportation. |
| 15. Geological Survey publications. | 26. Sociology. |
| 16. Secretary's office, Agric. Dept. | 27. Ethnology. |
| 17. Superseded by Price List 52. | 28. Finance. |
| 18. Engineering. Mechanics. | 29. Economics. |
| 19. Army and Navy. | 30. Natural wonders and antiquities. |
| 20. Lands. | |

- | | |
|---|-------------------------------------|
| 31. Education. | 42. Experiment Stations office. |
| 32. Noncontiguous territory and Cuba. | 43. Forest Service. |
| 33. Labor question. | 44. Plant Industry Bureau. |
| 34. Library of Congress publications. | 45. Public Roads Office. |
| 35. Periodicals. | 46. Soils Bureau. |
| 36. Tariff. | 47. Statistics Bureau, Agric. Dept. |
| 37. Animal Industry Bureau. | 48. Weather Bureau. |
| 38. Biological Survey. | 49. Proceedings of Congress. |
| 39. Chemistry Bureau, Agriculture Department. | 50. American history. |
| 40. Entomology Bureau. | 51. Health and hygiene. |
| | 52. Poultry: Birds. |
| | 53. Maps. |

[Numbers 1 to 9 were in a different series. They are out of print and will not be reprinted.]

Price list 35 will be on Geography.

A numbered series of briefer price lists, known as "Leaflets," is also in course of issue. The numbers and subjects of the Leaflets thus far available are, among others:

- | | |
|--|---|
| 2. Smithsonian Institution. | 30. A. L. A. catalog. |
| 3. National Museum. | 31. Manual of style. |
| 6. Nautical Almanac Office publications. | 33. Interstate commerce reports, general. |
| 10. Public documents. | 39. Fuel testing. |
| 14. Document guide. | 40. Structural materials. |
| 22. 8th Geographic Congress. | 41. Horses: Cattle. |

Documents can not be supplied free to individuals, nor can they be forwarded in advance of payment.

HOW TO REMIT.

Remittances should be made to the Superintendent of Documents, Government Printing Office, Washington, D. C., by postal money order, express order, or New York draft. If currency is sent, it will be at sender's risk.

To facilitate the payment of the cost of documents, the Superintendent of Documents will hereafter accept coupons issued by him instead of cash. Coupons of the value of 5 cents each are sold in sets of 20 for \$1.00. Address order to Superintendent of Documents, Government Printing Office.

Postage stamps, coins defaced or worn smooth, foreign money, certified checks positively will not be accepted.

No charge is made for postage on documents forwarded to the United States, Guam, Hawaii, Philippine Islands, Porto Rico, Canada, Cuba, or Mexico. To other countries postage is charged and remittances must cover

THE COMBUSTION OF ATMOSPHERIC NITROGEN.

(Paper read before the Chemists' Association at the annual meeting by Carlton C. James.)

The world's consumption of nitrate of soda in 1910 amounted to 2,251,000 tons with a value of about $78\frac{3}{4}$ millions of dollars. Practically all of this material comes from the natural saltpetre fields of Chili, a base of supply which cannot be considered inexhaustible by any means. In fact from estimates made in 1899 the nitre fields were expected to last for forty-six years and later estimates set the life of the fields at 75 to 100 years. Naturally another source of nitrogen would be desirable if we were to anticipate a bread famine and prevent it; for as Sir William Crookes pointed out some years ago in order to live we must have bread, and to have bread we must have wheat, and to grow wheat we must have nitrogen. There is abundance of nitrogen in the air, and when one stops to think that the nitrogen in the whole world's supply of nitrate of soda, over 337 thousand tons, could be obtained from the atmosphere covering only twelve acres of the earth's surface, the possibilities for profit in exploiting the atmosphere become apparent.

The combustion of atmospheric nitrogen dates back to Henry Cavendish, who about 1780 discovered nitrogen in the air, determined the composition of air with such accuracy that his figures are practically unchanged today, and who disclosed the fact that nitrogen and oxygen slowly combine under the action of electrical discharges.

And today a cheap source of electrical energy is the important point in the fixation of atmospheric nitrogen and the manufacture of nitrate of lime upon a commercial scale. Consequently we find this infant industry starting in the countries supplying the largest and cheapest source of electrical energy, such as Norway where the kilowatt year is obtained for from \$5.00 to \$8.00, or in Switzerland where the cost ranges around \$10.00.

Curiously enough the first attempt to obtain nitrogen from the air upon a commercial scale was made at Niagara Falls by Charles S. Bradley and D. Ross Lovejoy under their own patents. They formed the Atmospheric Products Company with a capital of \$1,000,000 back in 1902, but after two years' work they had to suspend operations. The price of energy at Niagara Falls, about \$20.00 per kilowatt year, probably had a good deal to do with the failure of this enterprise. Since Bradley and Lovejoy's experiments we find a number of methods have been patented and are in use, or have been tried, in countries having cheap water power. The process which seems to have given satisfaction for the longest time is one devised by Birkeland & Eyde in Norway.

This process consists briefly of driving a current of air through a chamber in which it comes in contact with an electric arc situated in a magnetic field. The electrodes are fork shaped, water cooled, and are set perpendicular to the lines of magnetic force so that the discharges form a disk of sparks. When once set these arcs burn weeks without regulation and the electrodes last for months. There is a limiting value, however, to the formation of nitric oxide, about 5%, and at the higher temperatures at which the oxidation takes place the action is reversible. It will be seen then that the important point in working the furnaces is to have the reaction take place at the highest temperature of the arc in order to get a high yield of nitric oxide and then to quickly cool the gas so that the reverse action does not take place. This has been accomplished in practice by sweeping the gas out of the region of the arc so as to be instantly cooled by the surrounding air, and by electrical and mechanical means whereby the arcs are interrupted several thousand times a second.

The waste heat from the treated air is used under the boilers for evaporating and concentrating purposes, and is then conducted to oxidation tanks where the NO is gradually changed to nitrogen peroxide as soon as the temperature falls below 600° C. by the excess oxygen always present. The gases then enter absorption towers filled with broken quartz or acid proof stones and down which dilute nitric acid slowly runs. When the acid reaches the proper concentration it is drawn for shipment or for the treating of either soda or lime to form nitrates. The oxides of nitrogen which escape the absorption towers are carried up a wooden tower in which they meet a fine spray of soda solution and are fixed as a weak solution of sodium nitrate and nitrite. From the nitric acid nitrate of soda, nitrate of potash, nitrate of lime, or ammonium nitrate may be formed. As a good quality of limestone is found near Notodden, where the Birke-land-Eyde system is installed and, as soda would have to be imported for manufacturing sodium nitrate, nitrate of lime has been the finished product. The limestone is treated with weak nitric acid and a dilute solution of nitrate of lime formed which is concentrated, crystalized and ground. It is then packed in eight barrels of about 220 pounds.

In 1909 the Notodden works produced 12,600 tons nitrate of lime, 2700 tons nitrate of soda, and 370 tons of sodium nitrate and nitric mixed. The markets of Europe have absorbed this output and will probably continue to do so to a greater or less extent for some time to come. The combustion of atmospheric nitrogen has passed out of the experimental stage and today is a well established infant industry. It is simply a matter of time until the process will be well known to the commercial and agricultural chemist.

DIVISION OF FORESTRY.

Honolulu, Oct. 31, 1911.

Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I have the honor to submit as follows the routine report of the Division of Forestry for the month of October, 1911:

During the first ten days of the month my own time was taken up with the preparation of a comprehensive planting plan for lands in the Koolau District, Maui, drawn up at the request of the managers of the Maui Agricultural Company and the Hawaiian Commercial & Sugar Company, as the result of various visits to that locality. The area to be planted—for the most part government land within the Koolau forest reserve—is the section along the irrigation ditches where the native forests died some years ago. The object of the planting is to fill up the blanks in the forest on the exposed ridges with trees able to grow under the unfavorable conditions that characterize that locality. The trees planted will be useful in themselves and will, it is believed, by affording protection against the strong and continuous winds, assist the return of the native forest on these ridges.

Later in the month I spent some time in preparing a brief address for the annual meeting of the Hawaiian Sugar Planters' Association, and in gathering data for and making out a supplementary report on the awa question and a letter of suggestion to the Bishop estate trustees in regard to a forest problem on one of their lands.

On October 18, in company with Mr. O. L. Sorenson, I visited Kawailoa, Waialua, Oahu, in this connection, going the next day to Pupukea, where I made a final inspection of the tree planting on "Water Reserve C." in the Pupukea forest reserve. All the trees on that tract having now reached the height required in the contract—3 feet—I have accepted the work as complete and have O. K.'d Mr. C. G. Owen's final bill under his contract. This little forest plantation is growing excellently. It is distinctly a good asset.

Arbor Day.

Preparations for Arbor Day, Nov. 10, 1911, have kept the nursery staff busy during the last half of the month. As usual a considerable number of consignments of trees have been sent out to the schools all over the Territory. On Arbor Day two dozen trees each will be given to as many persons as have made application and will call for the same at the Government nursery.

On October 28th Governor Frear issued a proclamation formally setting apart November 10th as Conservation and Arbor Day and recommending its general observance.

Trees for Plantations and Other Corporations.

During the past month several large orders of forest tree seedlings in seed boxes have been filled for sugar plantation companies and other corporations. Roughly, 56,000 seedlings have been sent out. Several other large orders have also been booked recently. Mr. Haughs' report will give the details.

By arrangement with Mr. W. T. Pope, Superintendent of Public Instruction, the remainder of the Congressional vegetable seed on hand at the Government nursery has been sent out to the principals of schools having gardens.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT ON AWA.

Honolulu, Oct. 26, 1911.

Board of Commissioners of Agriculture and Forestry,
Honolulu.

GENTLEMEN:—As a result of a conference with the President of the Board relative to the disposition of awa in forest reserves. I have to submit as supplementary to my report of July 10, 1911, on this subject, the following statement:

By direction of the Board a circular letter was sent out some weeks ago to most of the district foresters asking for information as to the quantity of awa in their districts, price and other matters. To this letter there were 18 replies. The majority say that there is little awa growing wild on Government lands, the bulk of that at present in the market being obtained from cultivated patches. Awa is, however, reported from Hanalei, Kauai; Kohala and Puna, Hawaii, and Hana, Maui. The price per ton for awa seems to vary considerably with the locality, ranging from \$140 to \$320 or more a ton, delivered at steamer landing Hana, 7c lb.; Kona, 11½-12c; Hanalei, 4c green (16c dry). These figures coincide with those given by Mr. von Damm, quoted in my former report. It takes from 3 to 4 lbs. of green awa to make 1 lb. of the dried product.

In selling awa it is obviously more satisfactory that a definite percentage should be paid per pound, or per ton, for the quantity gathered where this can be done without necessitating much outlay for inspection. Where it is possible to keep separate all of the awa gathered by one person that comes from a given piece of Government land, it should be easy to secure copies of the

freight bills from the transportation companies, on the basis of which payment could be made.

When it is not feasible to do this a license may well be granted giving to a stated person for a definite term the right to gather awa from a specified land. This is a simpler method, but as the Government has no way of knowing, except at prohibitory expense, just how much awa there is on any one piece of land the returns under this method are not likely to be as large as when payment is made by weight. Therefore, whenever possible the first method should be used. Otherwise, when the right is granted at all, it should be by the second method.

In view of the above it is now recommended that the Board adopt the following requirements as its policy in selling awa and other minor forest products from the forest reserves:

(1) That all licenses the annual payments of which amount to over \$100 be sold at public auction.

(2) That an upset price be fixed which for awa shall in no case be less than $\frac{1}{2}c$ per pound green, or $2c$ per pound dry weight. Where it seems justifiable a certain percentage of the rental should be demanded at the time of the auction from the successful bidder. In the case of smaller sales the rate should be governed by the same considerations.

(3) That payments under the licenses be made at least every six months.

(4) That the term of the license be determined separately in each case. In general for awa it should not exceed two years.

(5) That for every mature awa plant removed there be planted 18 slips (akaa).

(6) That the licenses be granted only on condition that reasonable care be exercised not to damage unnecessarily the remaining forest growth, and that every precaution shall be taken to prevent the starting of forest fires.

(7) That the Board reserves the right to reject any and all bids.

It is further recommended, where awa or other minor forest products are desired for strictly personal use by people living in the vicinity of a given forest reserve, that the custom of granting free use permits be continued; in this case the permit to be issued, upon application, for a limited period only, by the local district forester, in his discretion.

In the matter of the applications for awa that have recently been made to the Board, several are for lands still under lease over which this Board has at present no jurisdiction. With the others now pending and with later applicants it is recommended that licenses be sold in conformity with the general plan herein outlined, for the rights to collect awa in the several forest reserves; the method of payment to be as far as possible on a basis

of weight; and that the working out of the details in each case be left to the President of the Board and the Superintendent of Forestry with power to act.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

Honolulu, November 1, 1911.

Hon. Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I respectfully submit my report of the work of the Division of Entomology for the month of October as follows:

During this month, we boarded 27 vessels and found 19 carrying fruit, vegetables and plants.

After a careful inspection of the various shipments, the following results were obtained:

<i>Disposal with principal causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	850	20,457
Burned	39	39
Fumigated before releasing.....	7	335
Total inspected	896	20,831

Rice Shipments.

During the month there arrived from Japan 20,233 bags of rice which were found free from pests and allowed to be delivered.

Pests Intercepted.

Two shipments of beans arrived on the Nippon Maru, which were infested by lepidopterous larvae (*Family Phycitidas*). The whole shipment was immediately placed in our fumigating rooms and subjected to the fumes of carbon bisulphide using a double exposure. All larvae were then found dead and the shipment was released with a warning to the consignees not to receive any more shipments in like condition.

In mail we found three lots of chestnuts which were badly infested with two species of weevils—the large chestnut weevil (*Curculio pubescens*) and the lesser chestnut weevil (*Balaninus*). All three lots were first fumigated with carbon bisulphide and then burned.

Several small shipments of plants and cutflowers were found infested with aphids and the more common scale insects and were fumigated before being released.

On a small Otahite orange tree sent by the Storrs Harrison Company, Painesville, Ohio, to a party here we found four different scale insects, namely: *Pseudococcus citri*, *Chrysomphalus aonida*, *Lepidosaphes bockii* and *Parlatoria pargandii*. The plant was not more than a foot high and was burned. I wrote to the nursery firm that all such shipments would be immediately destroyed on arrival.

Hilo Inspection.

Bro. M. Newell, inspector at Hilo, reports the arrival of 7 vessels during the month. He found 3 carrying vegetable matter: 133 lots, 2046 parcels were passed as free from pests; 1 lot of celery destroyed on account of blight and 36 sacks of potatoes were overhauled before they were allowed delivery.

Inter-Island Inspection.

On my return from the coast I have looked into the work performed by the two Inter-Island inspectors and herewith submit their reports:

During July, August, September and October the following number of vessels were attended to and the following number of packages containing fruit, vegetables and plants were prevented from being taken by passengers:

July	—Steamers attended and inspected.....	51	...
	Packages stopped from being taken... ..		95
August	—Steamers attended and inspected.....	59	...
	Packages stopped from being taken... ..		103
September	—Steamers attended and inspected.....	49	...
	Packages stopped from being taken... ..		70
October	—Steamers attended and inspected.....	56	...
	Packages stopped from being taken... ..		110
	Fruit	74	
	Vegetables	24	
	Plants	12	
Total steamers attended.....		215	...
Total packages rejected.....			378

Sixty-five packages of plants met the requirements, being free from pests and having sterilized soil and were allowed to be shipped. One package of beans infested with weevils was taken and destroyed.

Respectfully yours,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, Nov. 10, 1911.

Hon. C. S. Judd, President and Executive Officer,
Board of Agriculture and Forestry.

SIR:—I have the honor to submit herewith a report on the work of the Division of Animal Industry for the month of October, 1911.

GLANDERS.

After a lapse of nearly one year glanders has again made its appearance, though only with a single case and under such circumstances as to make it safe to state positively that no further cases are likely to occur and that the infection has been effectively stamped out. The case is, however, of interest on account of the possibility of an extensive outbreak being narrowly escaped, and as an illustration of the effectiveness of energetic measures when promptly taken and conscientiously carried out.

On October 5 I received a letter from Dr. Vans Agnew, veterinarian to the 5th U. S. Cavalry, Schofield Barracks, informing me that one of the horses in Troop A was suffering from a nose disease which, though far from being characteristic of glanders, still was accompanied by lesions and symptoms sufficiently grave to warrant caution, and requesting me when convenient to come to Leilehua and make an examination of the animal. As a result of this I left for Leilehua the following day, but unfortunately did not find Dr. Vans Agnew or locate the animal which had been isolated, before it was too dark to make an investigation. On my return to Honolulu I found another letter from him saying that the animal was improving and suggesting that the case was one of the so-called Hawaiian nose disease, and further informing me that the entire regiment was starting on a practice march around the Island the following day and that he would meet me in Honolulu when the regiment reached there. On Monday, October 9, at the last regular meeting of the Board, I informed the members that I had just received a telephone message from the veterinarian left in charge at Leilehua during Dr.

Vans Agnew's absence, saying that he had seen the case in question and found it very suspicious, asking that I come out immediately, as a result of which I left the Board meeting for Leilehua. On my way to an accident to the automobile we were again overtaken by darkness and were compelled to remain at Wahiawa until the morning when the animal was located. An isolation stall, which had been built in a gulch on the reservation, and which the cavalry stables and so well segregated the animal. The veterinarian, however, failed to locate it in an

hour's search and we were forced to return to headquarters for a guide. The animal was found to suffer from ulcerations of the mucous membrane in both nasal chambers with considerable sticky discharge from both nostrils, which discharge, at intervals, was mixed with blood to the extent of constituting a hemorrhage or epistaxis. There was, however, no swelling of the sub-maxillary glands and, as the animal had been under treatment for warts and tumors in the nose for several months past, it did not seem likely that the case was one of glanders unless as a secondary and very recent infection. The fact that the ulcerations were *not* located on the septum (the partition between the nasal chambers) in connection with the extremely swollen condition of the mucous membrane immediately surrounding the ulcers likewise pointed to a negative diagnosis as far as glanders was concerned, but pointed on the other hand equally certain to epizootic lymphangitis, a disease which in these Islands has proved itself far more dangerous and much more difficult of eradication than glanders. It may be mentioned that in two outbreaks of this disease, both on the Island of Maui, though widely separated, not less than \$3,000 worth of horse stock had to be sacrificed or died within a week or ten days, in each case. I did therefore feel a great deal more apprehension than had the case proved to be glanders. However, in order to eliminate the question of glanders entirely the animal was subjected to the mallein test, to which it gave not the slightest reaction, thereby practically confirming the other diagnosis.

It may not be out of the way here to explain why this case is described under the heading of "Glanders," when, in fact, the animal was suffering from a specific infectious disease, not even caused by a bacillus, like glanders (*bacillus malleus*), but by a fungus (*saccharomyces farciminosus*); only that the nature, symptoms, course and termination of the two diseases, the latter almost invariably fatal after a most violent course extending, as a rule, only over a few days, and as the accepted postulates of veterinary jurisprudence are identical for the two diseases in those countries where both occur with equal virulence, it has been considered neither advisable nor desirable to promulgate special rules and regulations for a disease which for centuries has been considered as, or classified with, glanders or farcy, and which is not even possessed of a name comprehensible to a layman.

When, consequently, the diagnosis of epizootic lymphangitis had been accepted, the situation became as stated very grave. The affected animal, which was rapidly getting worse, had belonged to Troop A which only a few days before had been disbanded and the individual mounts distributed among the eleven other troops of the regiment. If, therefore, any of the contacts, that is, animals which had been more or less exposed to the infection from contact with the affected animal, had become in-

fect, there was a likelihood of every one of the remaining troops developing the disease in varying numbers of cases, and when to this is added that the entire regiment had left the reservation for a practice tour around the whole island it will be seen that there was sufficient cause for apprehension, not to say alarm. When, therefore, the following day the regiment arrived at Fort Shafter I immediately called on Dr. Vans Agnew and laid the facts before him, suggesting the inspection of all the animals without delay. This, however, did not prove necessary as the doctor had been with the regiment all the time and every case of sickness was known to him and so far none had shown any suspicious symptoms. That was encouraging so far, as the hardships of the tour undoubtedly would have caused the early appearance of symptoms had any of the animals become infected. The doctor was, however, positive that there was no discharge from the nose of any of the mounts or draft animals and the conclusion was therefore justified that no infection could have been scattered by the regiment even if some cases might develop later on.

It was nevertheless decided to submit the matter to General Macomb without delay and as the possible contacts were scattered through all the troops he was easily persuaded that no half-way measures would be of any avail. With the General's sanction of a thorough disinfection of all of the stables at Schofield Barracks I applied to the Board of Health for the loan of the portable steam disinfection plant, which, the following morning, was placed on board a train and shipped to Leilehua.

In this connection I wish to state that the Board of Health, represented by Mr. Charlock, acting president, and Mr. Kirk Porter, secretary, did everything possible to assist in eradicating this infection which threatened the decimation of the cavalry and artillery horses stationed here. Not alone did they supply the engine with hundreds of feet of hose, but they advanced the requisite disinfecting material (corrosive sublimate and hydrochloric acid), and for two days Mr. Charlock, with an engineer and an assistant, supervised and directed the work, giving their time as well as experience in handling as extensive an undertaking as the disinfecting of 1200 stalls.

A force of privates was put to work removing all straw, bedding and feed from mangers, racks and stalls, all of which was taken away and destroyed by burning, after which the hose gang saturated all woodwork and floors with the strong disinfectant. After this had been allowed to soak in, the surplus was washed away with clean water in the same manner as the disinfectant had been applied, and it is a matter of record that a single case of poisoning was reported after the animals returned to the stalls. All watering troughs were removed and disinfected and the fact that only one sus-

picious case has been reported since is ample proof of the thoroughness of the work.

When the regiment returned to Leilehua shortly after noon on October 13 everything was ready for the animals, but as a further precaution every horse and mule was inspected before being allowed to go to its stall.

The following day another suspicious case was reported and the same is still kept segregated; the mallein test has been applied with negative result, and three guinea pigs inoculated intra-abdominally with the nasal discharge have failed to develop symptoms indicative of glanders. The animal has been visited regularly, but until every possibility of infection has disappeared it will be continued in quarantine.

SHEEP DISEASE ON LANAI.

Appended to this report will be found the correspondence pertaining to an outbreak of disease among the sheep on the Island of Lanai, where the assistant territorial veterinarian is now temporarily located. The deputy Territorial veterinarian from Maui is also on the island, the two coöperating in an effort to reach some definite conclusion as to the nature of the epidemic which has carried off a great number of animals. From the description forwarded by the manager of the Lanai Ranch it would seem that, ever since another epidemic among the sheep was investigated during the latter part of last year, a full report of which will be found in the annual report of this division for 1910, the sheep have continued to die in greater or less numbers and at varying periods of intervals. Dr. Fitzgerald from Maui was first directed to investigate and report on the present outbreak, he being inclined to believe that the mortality was due to musty manienic grass, for which diagnosis there is ample support. The manager, however, leans toward a theory of an infectious disease, and even though I have been unable to find in the evidence submitted any reasonable grounds on which to base the diagnosis it was decided that so long as the sheep continued to die it would be better to make a bacteriological and microscopic investigation, and with the consent of the president of the Board, Dr. Case was instructed to equip himself with a complete outfit for this work and is, as stated, now looking into the matter, Dr. Fitzgerald conducting the field work and Dr. Case the laboratory work. Until the results of this investigation have been received and further worked up, it would seem better not to express any opinion on the subject, even though much could be said on the probable cause of the many deaths. Most of this is contained, however, in the correspondence submitted herewith.

ANIMAL QUARANTINE STATION, HONOLULU.

In accordance with instructions received at a recent meeting

of the Board (Nov. 2) the following has been posted conspicuously at various places at the Quarantine Station on the Beach Road:

BOARD OF AGRICULTURE AND FORESTRY.

Division of Animal Industry.

NOTICE.

A charge of 25c per head per day will be levied on all horse stock or other large animals, and 10c per head per day for smaller animals (sheep, swine, goats, etc.) left on the premises of the animal quarantine station beyond the required quarantine period, or for non-quarantinable stock sent to the station for keep, detention or observation, except when so ordered by the Board or by the officers of the Division of Animal Industry.

The Board reserves the right to remit such charges, when, in its opinion, the detention of animals was either unavoidable or required for the interest of the service.

All damages to the fences, posts, gates, chutes, feed racks, mangers, buildings or any other part of the premises, due to the carelessness or negligence on the part of the owners, agents, consignees, or their employees, will be charged against the stock and must be settled for before the animals are allowed to leave the station. The same applies to accrued charges for keep or detention as above specified.

CHAS. S. JUDD,

Chairman, Committee on Animal Industry, President and Executive Officer.

Honolulu, November 2, 1911.

As the notice differs slightly from the one originally suggested, I beg to ask the Board's approval of the same or else instructions as to changes therein.

HILO QUARANTINE STATION.

The question of the quarantine station for Hilo is still in abeyance until it has been decided how the Board can best obtain possession of the required site. Until this has been decided definitely the tenders for bids for construction cannot be advertised. The Board's instructions in regard thereto are respectfully awaited.

The announcement of the arrival of the S. S. Lurline on November 1 with a large consignment of live stock, among which are several stallions and jacks, all supposed to be very high class animals, revived the question of reconstructing the stallion boxes at the quarantine station to make them safe for the housing of such animals. It will be remembered that the sum of \$10,000 appropriated by the Board for the purpose at a meeting held last, but with my absence from the Territory during the month of September the subject was dropped until it now

presents itself again urgently. With the approval of the president I asked for bids on this work but the figures submitted by the two contractors who furnished estimates were far in excess of the funds available. For this reason it was decided to allow the stalls to remain at their present size, which is 9x12 feet inside measure, and simply to reinforce them by lining them all around with one-inch lumber; also to have the hinges and hooks of the doors made stronger and a bar of 3x4 lumber set in stake boxes, provided for the opening above each half door. This is now being done, and while the price will be well within the appropriated money the stalls will be safe and comfortable, though perhaps not quite as large as might be required for very bulky animals.

The ravages caused by the use of the station as a horse-selling emporium are becoming more and more manifest and a number of the pens must be either rebuilt or all the wires tightened. This will be done now so far as the remaining funds will permit.

As per instructions received letters were sent to the Schuman Carriage Co. and the Club Stables, as per copies appended, informing them that, until the money due the Board for the use of the station had been paid, no further permit to place or keep non-quarantinable stock on the premises would be granted. The sum of \$10.50 was collected from Mr. Bellina for the keep of 21 animals for two days, he refusing to pay for the third day on account of not having received due notice in regard to the order. Mr. Schuman's application for the use of the station for his last importation of mules was denied for the reason above stated.

The report of the assistant Territorial veterinarian covering the importations of live stock and other routine work will be submitted on his return, as he had to leave on short notice and could not get it together before his departure.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.



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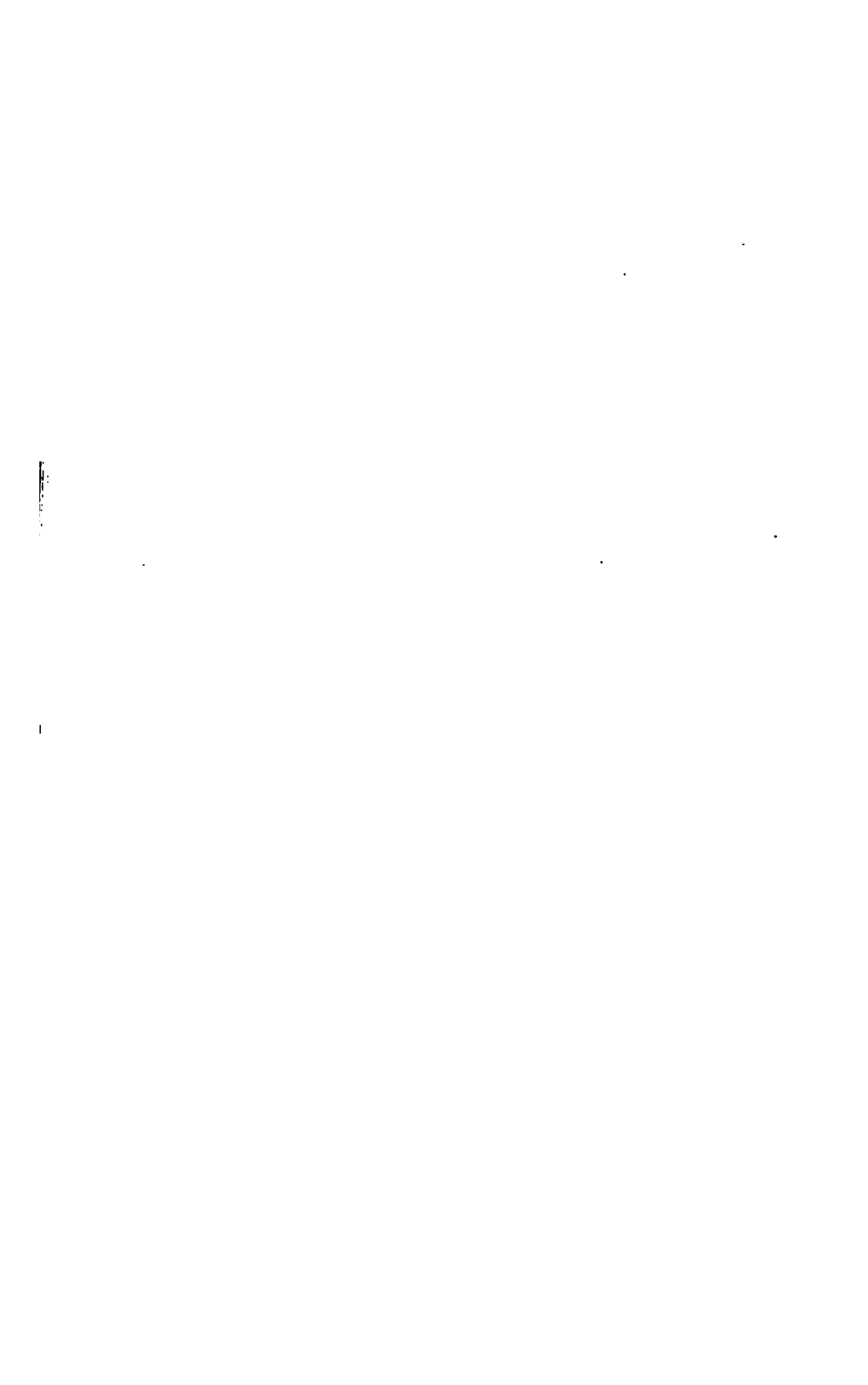
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